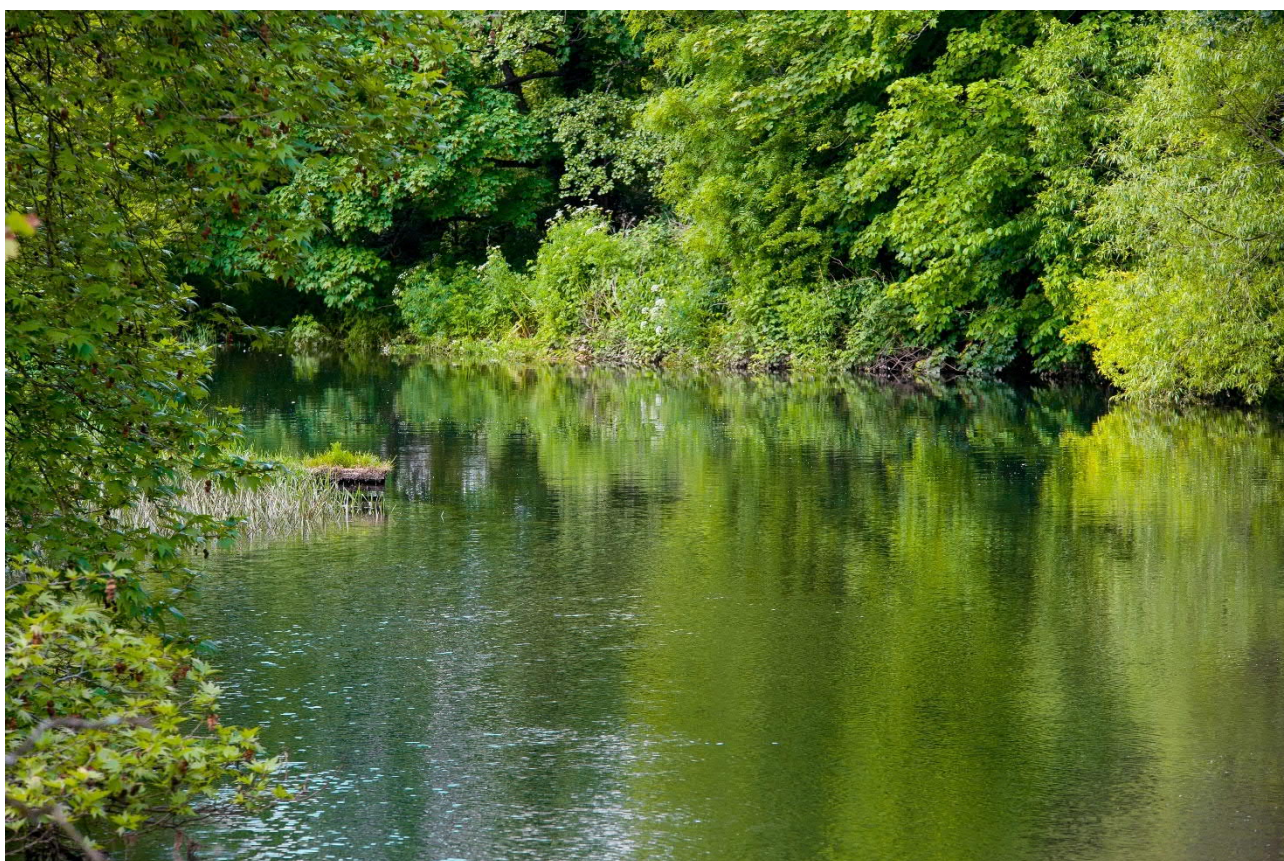


Strategic regional water resource solutions: detailed feasibility and concept design

Standard gate two submission for Thames Water to Southern Water Transfer (T2ST)

Date: 14 November 2022



Notice

Position Statement

- *This document has been produced as part of the process set out by the Regulators' Alliance for Progressing Infrastructure Development (RAPID) for the development of the Strategic Resource Options (SROs). This is a regulatory gated process allowing there to be control and appropriate scrutiny on the activities that are undertaken by the water companies to investigate and develop efficient solutions on behalf of customers to meet future drought resilience challenges.*
- *This report forms part of a suite of documents that make up the 'Gate 2 submission.' That submission details all the work undertaken by Thames Water and Southern Water in the ongoing development of the proposed SROs. The intention of this stage is to provide RAPID with an update on the concept design, feasibility, cost estimates and programme for the schemes, allowing decisions to be made on their progress and future funding requirements.*
- *Should a scheme be selected and confirmed in the Thames Water and Southern Water final Water Resources Management Plans, in most cases it would need to enter a separate process to gain permission to build and run the final solution. That could be through either the Town and Country Planning Act 1990 or the Planning Act 2008 Development Consent Order process. Both options require the designs to be fully appraised and, in most cases, an Environmental Statement to be produced. Where required, that statement sets out the likely environmental impacts and what mitigation is required.*
- *Community and stakeholder engagement is crucial to the development of the SROs. Much more detailed community engagement and formal consultation is required on all the schemes at the appropriate point. Before applying for permission, Thames Water and Southern Water will need to demonstrate that they have presented information about the proposals to the community, gathered feedback and considered the views of stakeholders. We will have access to that feedback and, where possible, make changes to the designs as a result.*
- *The SROs are at a very early stage of development, despite some options having been considered for several years. The details set out in the Gate 2 documents are still at a formative stage and consideration should be given to that when reviewing the proposals. They are for the purposes of allocating further funding, not seeking permission.*

Disclaimer

This document has been written in line with the requirements of the RAPID Gate 2 Guidance and to comply with the regulatory process pursuant to Thames Water's and Southern Water's statutory duties. The information presented relates to material or data which is still in the course of completion. Should the solution presented in this document be taken forward, Thames Water and Southern Water will be subject to the statutory duties pursuant to the necessary consenting process, including environmental assessment and consultation as required. This document should be read with those duties in mind.

Contents

1.	Executive summary	1
2.	Background and objectives.....	4
3.	Solution design, options and sub-options	5
4.	Water resource assessment.....	14
5.	Drinking water quality considerations.....	17
6.	Environmental assessment.....	18
7.	Programme and planning	25
8.	Solution costs and benefits.....	40
9.	Stakeholder and customer engagement	44
10.	Board statement and assurance	51
11.	Efficiency of expenditure for Gate 2 and forecast.....	53
12.	Conclusions and recommendations	56
13.	Supporting documentation.....	59

Glossary

Acronym	Definition
AA	Appropriate Assessment - under the Habitats Regulations Assessment
ACWG	All Company Working Group
AIC	Average Incremental Cost
AMP	Asset Management Plan
AONB	Area of Outstanding Natural Beauty
BNG	Biodiversity Net Gain
BPT	Break Pressure Tank
CAP	Competitively Appointed Provider
Capex	Capital Expenditure
CCG	Customer Challenge Group - a regional CCG has been established by WRSE
CCW	Consumer Council for Water
CEMP	Construction Environmental Management Plan
CO ₂	Carbon Dioxide
CPIH	Consumer Prices Index with Housing
DCO	Development Consent Order - planning under the Planning Act 2008
Defra	Department for Environment, Food and Rural Affairs
DO	Deployable Output
DPC	Direct Procurement for Customers
DWI	Drinking Water Inspectorate
DWSP	Drinking Water Safety Plan
EA	Environment Agency
EAR	Environmental Assessment Report
EIA	Environmental Impact Assessment
ENG	Environmental Net Gain
FD	Ofwat Final Determination
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HE	Historic England
HRA	Habitats Regulations Assessment
INNS	Invasive Non-Native Species
LWS	Local Wildlife Site
MI/d	Mega Litres Per Day
NAU	National Appraisal Unit (made up of the EA and NE)
NC	Natural Capital
NCA	Natural Capital Assessment
NE	Natural England
NPV	Net Present Value

Acronym	Definition
Opex	Operational Expenditure
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PR19	Price Review 2019
PS	Pumping Station
RAPID	Regulators' Alliance for Progressing Infrastructure Development
RCV	Regulatory Capital Value
SEA	Strategic Environmental Assessment
SESRO	South East Strategic Reservoir Option. New reservoir development near Abingdon
SEW	South East Water
SIPR	Specified Infrastructure Projects Regulations
SPA	Special Protection Area
SPZ	Source Protection Zone
SRO	Strategic Resource Option
SSSI	Site of Special Scientific Interest
STT	Severn Thames Transfer
SWOX	Swindon and Oxfordshire water resources zone
T2AT	Thames Water to Affinity Water Transfer
T2ST	Thames Water to Southern Water Transfer
tCO ₂ e	Carbon Dioxide Equivalent (metric tons)
Totex	Total Expenditure
VfM	Value for Money
WACC	Weighted Average Cost of Capital
WFD	Water Framework Directive
WFLH	Water for Life Hampshire
WQRA	Water Quality Risk Assessment
WRMP	Water Resource Management Plan
WRSE	Water Resources South East
WRZ	Water Resource Zone
WSR	Water Supply Reservoir
WTW	Water Treatment Works
WwTW	Wastewater Treatment Works

1. Executive summary

1.1 Context

- 1.1.1 The Thames Water to Southern Water Transfer (T2ST) is a long-term resilience option that could form a key strategic link within the South East region. T2ST would enable available water from Thames Water's Swindon and Oxfordshire (SWOX) water resource zone in Oxfordshire to be transferred to Southern Water's Hampshire area. T2ST is dependent on the prior development and commissioning of a water resource option to provide additional water in the SWOX water resource zone – the Severn Thames Transfer (STT) and/or the South East Strategic Reservoir Option (SESRO), a new reservoir development near Abingdon.
- 1.1.2 We submitted the Gate 1 report for T2ST (and supporting annexes) to the Regulators' Alliance for Progressing Infrastructure Development (RAPID) in July 2021. RAPID published the final decision in December 2021 and concluded that further funding should be allowed for T2ST to progress to Gate 2.

1.2 Gate 2 work undertaken to date

- 1.2.1 We have undertaken all Gate 2 work in accordance with Ofwat's Final Determination¹ for Asset Management Period 7 (AMP7) and have addressed all actions set out by RAPID in the Gate 1 Final Decision. We have undertaken engineering, environment, stakeholder, planning, commercial and procurement Gate 2 workstreams to take forward the six Gate 1 T2ST options. This has included further options appraisal, initial pipeline corridor and site assessment, development of the design, completion of additional engineering and environmental assessments, development of a commercial and procurement strategy, and stakeholder engagement.
- 1.2.2 We have undertaken the work to Gate 2 efficiently and effectively through close collaboration between Thames Water and Southern Water, by aligning the scope directly to the RAPID Gate 2 requirements and using existing, competitively tendered procurement routes. This has led to spending of £2.168m out of a Gate 2 budget of £3.122m. All spend is reported in 2017/18 base prices.
- 1.2.3 Both Thames Water and Southern Water have assured the Gate 2 submission with external assurance by Jacobs for key aspects of the submission. Thames Water and Southern Water have both signed the Board Assurance Statement.
- 1.2.4 We note that this option is in the early stages of development, and delivery is more than 10 years in the future. The maturity of the information reflects this early-stage development and that it may change as the options are developed further.

¹ <https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-Strategic-regional-water-resource-solutions-appendix.pdf>

1.3 Key facts “at a glance”

1.3.1 At this Gate 2 submission, key facts relating to T2ST are summarised below, with links to the sections of the report where more information is provided.

Table 1-1: Key facts “at a glance”

Topic	Response for T2ST	Sections
Location	T2ST is located in the counties of Oxfordshire, Berkshire and Hampshire. The preferred options would transfer water from SESRO and/or STT, treated to potable standards by a new treatment works west of the A34 at Drayton, and then pumped via a pipeline through parts of Oxfordshire and Berkshire to Southern Water operational sites in Hampshire.	3
Preferred options	There are two preferred options at this Gate 2 submission: pipeline corridor option B and pipeline corridor option C, both with similar treatment and transfer infrastructure requirements. The preferred options are both potable water transfers.	3
Deployable output	We have assessed the preferred options at maximum scheme capacity of 50 mega litres per day (Ml/d), 80Ml/d and 120Ml/d. The Water Resources South East (WRSE) draft Regional Plan and company draft Water Resources Management Plan (WRMP) identify a maximum T2ST transfer requirement of 120Ml/d and earliest commissioning date of 2040.	3, 4
Earliest delivery date	The draft WRSE Regional Plan does not require the T2ST scheme until 2040 at the earliest. The lead time, including two years programme float, is 14 years. Therefore, if work was to ramp up immediately after Gate 2, the project could be ‘construction ready’ in AMP8 (2025–2030) and operational as early as 2036, assuming a suitable source was available. However, as the project does not need to be ‘construction ready’ in AMP8 to meet an operational date of 2040, it is proposed that the scheme does not continue on a path to be ‘construction ready’ in AMP8 and instead continues on a slower track towards a proposed Gate 3 ‘Checkpoint 1’ in March 2024. This allows the project to continue to be derisked and the interaction with other schemes better developed while preventing inefficient or abortive work from being done until the outcome of the consenting process for a new source of water has been progressed.	4, 7
Cost	There are cost estimates for both options B and C, including capex (capital expenditure), opex (operational expenditure), net present value and average incremental cost values, as presented in Section 8. Capex is in the range of £518m to £877m. All estimates include optimism bias and costed risk.	8
Carbon	We have modelled carbon for each preferred option for both capital carbon and operational carbon. A summary table of carbon values for preferred options B and C is provided in Section 6.6. Whole life carbon over an 80-year appraisal period is in the range of 154,100 to 340,500 tCO ₂ e (Carbon Dioxide Equivalent (metric tons)) at maximum capacity.	6
Environmental impacts	We have identified the environmental and social risks and impacts of each preferred option. This work has been supplemented by specific assessments, including a Water Framework Directive (WFD) assessment, an informal Habitats Regulations Assessment (HRA), an Invasive Non-Native Species (INNS) risk assessment, and assessments of natural capital, biodiversity net gain and carbon. We have also prepared a Strategic Environmental Assessment (SEA), primarily to provide consistency of information on the T2ST options for use in the SEAs for Southern Water’s WRMP and the Regional Plan. We undertook a desk-based appraisal to identify potential impacts on the environment from the pipeline corridors and above ground infrastructure required as part of the T2ST Strategic Resource Option (SRO). The results of the regulatory assessments fed into the environmental appraisal.	6

Topic	Response for T2ST	Sections
	In applying the environmental assessments to the route corridors and sites comprising the preferred options, we identified a number of constraints and issues for further investigation and work. However, the assessments did not identify any significant environmental risks where mitigation could not be provided and the viability of the T2ST scheme would be affected.	
Water quality risks	The approach for the T2ST water quality assessment for Gate 2 follows the All Company Working Group (ACWG) methodology to ensure a consistent process of reviewing the strategic water quality risks. The T2ST SRO preferred options B and C at Gate 2 may each be supplied by several different water sources, each with differing water quality risk profiles. These include raw water abstracted directly from SESRO and/or from STT. We have revised risk assessments for each water source following the Gate 2 ACWG Water Quality Risk Assessments (WQRA) workshop and identified the limiting hazards and control methods in place for each risk. In all options and water source scenarios, treated water from new surface water sources will be introduced to new regions, including the currently groundwater-fed areas of Kingsclere and Andover.	5
Planning issues	As a potable transfer, T2ST would not automatically be a nationally significant infrastructure project. The recommended planning strategy is to seek a Section 35 Direction to confirm that T2ST is nationally significant infrastructure requiring an application for a Development Consent Order.	7
Procurement	<p>The procurement assessment for Gate 2 supports the Gate 1 conclusion that T2ST is potentially suitable for competitive procurement through Direct Procurement for Customers (DPC), dependent on further exploration of value for money benefits. Further work (including market testing and modelling) is required to validate DPC value for money assumptions, as part of post-Gate 2 development.</p> <p>As Southern Water customers are the main water resource beneficiaries of the T2ST scheme, we recommend that Southern Water takes the lead role in T2ST promotion post-Gate 2, and continues to consult with Thames Water (and other relevant stakeholders) throughout the ongoing development of the scheme.</p>	7
Key risks	<p>The scheme is considered to be viable and there are no major barriers to scheme progression identified at this stage. The most significant risks are:</p> <ul style="list-style-type: none"> • The interaction with the Regional Plan and WRMPs to confirm the overall need, timing, capacity and utilisation of the scheme. This is being mitigated through ongoing collaboration with the regional planning teams. • The interdependencies with other schemes, from a commercial, consenting and operational perspective, including both STT and SESRO as potential sources, and ongoing Southern Water schemes. This is being mitigated through close collaboration with the other project teams. 	7
Customers and stakeholders	There is, in principle, support for sharing water resources across the South East region subject to sufficient resources, compliance with water quality and environmental requirements, and responsiveness to local issues and concerns. Some customers and stakeholders have expressed concerns in representations on the WRSE emerging regional plan about transferring water from Oxfordshire to Hampshire via T2ST, in the context of the need for SESRO.	9
Recommendations	<p>We recommend that development of the T2ST scheme continues to a Gate 3 Checkpoint 1 in March 2024, at which point a decision on its further development is made. A budget of £1.899m (in 2017/18 prices) is recommended to develop the project further to Gate 3 Checkpoint 1.</p> <p>As Southern Water customers are the main water resource beneficiaries of the T2ST scheme, we recommend that Southern Water becomes accountable for T2ST promotion post Gate 2. It is proposed that the 50:50 split in development costs between Southern Water and Thames Water is continued through to the end of AMP7 at which point Southern Water would pay for 100% of the development.</p>	7, 12

2. Background and objectives

2.1 Context

- 2.1.1 The Thames Water to Southern Water Transfer (T2ST) is a long-term resilience option that could form a key strategic link within the South East region, enabling water from SESRO and/or STT in Thames Water's Swindon and Oxfordshire (SWOX) water resource zone (WRZ) to be transferred to Southern Water's Hampshire area. The transfer would enable future forecast supply demand deficits in Southern Water's WRZs arising from abstraction reductions, climate change and growth forecast within the Water Resources South East (WRSE) draft Regional Plan to be met.

2.2 National Framework and Regional Plan requirements

- 2.2.1 The Environment Agency's (EA) National Framework (Meeting our Future Water Needs: A National Framework for Water Resources²) was published in March 2020. The WRSE emerging Regional Plan was published in January 2022³, and the WRSE draft Regional Plan was published in November 2022.
- 2.2.2 The National Framework explores England's strategic long-term water needs across all key sectors up to and beyond 2050, emphasising that if action is not taken many areas of England will face water shortages. The National Framework recognises that an increasing population, demand from agriculture and industry and improving our resilience to drought will all put significant pressures on our water resources, and climate change will only exacerbate these pressures.
- 2.2.3 If no action is taken, the National Framework identifies that around 3,435 million litres per day (3,435 Ml/d) extra capacity is likely to be needed in England by 2050 to meet future pressures on public water supply. While projections beyond 2050 carry increasing uncertainty, its analysis suggests something in the region of 5,500 to 6,000 Ml/d additional water may be needed by 2100.
- 2.2.4 The National Framework notes that the South East faces the greatest pressures on public water supplies. The potential additional water required by 2050 could be as much as half the total needed nationally. Over a third of this is driven by the need to increase public water supply resilience to droughts. Increased water consumption and increased protection for the environment also have significant impacts, and reduced supplies due to deteriorating water quality, is another driver of water need.
- 2.2.5 The National Framework does not explicitly set out requirements that strategic options must meet. Instead, it provides guidance and support for regional and company level planning to tackle the scale of future water resources requirements it identifies.
- 2.2.6 The WRSE draft Regional Plan adopts the National Framework approach in the context of detailed modelling and forecasts for the South East region. This identifies that if no

² <https://www.gov.uk/government/publications/meeting-our-future-water-needs-a-national-framework-for-water-resources>

³ <https://wrse.uk.engagementhq.com/our-regional-plan>

action is taken, a supply demand deficit of between 560 and 2,060 Ml/d will exist by 2050, forecast to increase to between up to 720 and 2,720 Ml/d by 2075. While demand management measures will deliver significant reductions in use, significant investment in new water resources infrastructure is required.

2.3 T2ST and National Framework/Regional Plan requirements

2.3.1 T2ST is considered to be in accordance with the National Framework and Regional Plan requirements, in that:

- T2ST forms part of a portfolio of supply side strategic options identified as being required in the WRSE draft Regional Plan. The National Framework supports this approach, recognising that substantial new supply infrastructure will be required, even with significant demand savings secured through measures implemented in AMP7, and that are expected (subject to funding) to continue in AMP8.
- A significant proportion of new supply infrastructure, including T2ST, is required as a result of abstraction reductions planned to deliver additional environmental protection, a key pressure for water resources in the National Framework.
- Increased resilience and an improved ability to move water to where it is needed, such as through T2ST, lies at the heart of the WRSE draft Regional Plan, in accordance with the National Framework. We have investigated and assessed these transfer options, incorporating the views of the Environment Agency, Drinking Water Inspectorate (DWI) and Regulators' Alliance for Progressing Infrastructure Development (RAPID), to make sure that planned transfers are feasible and that any issues are carefully managed.
- The T2ST proposals are an integral part of the WRSE draft Regional Plan, and draft company Water Resource Management Plans (WRMPs), with the scheme delivering increased drought resilience and helping South East water companies to plan and manage future uncertainties, in accordance with the National Framework.

3. Solution design, options and sub-options

3.1 Solution description

3.1.1 After completing an updated options appraisal (see Annex A1), route and site selection process (see Annex A2) and concept design stage (see Annex A3), we have developed two preferred T2ST pipeline corridor options (B and C) at Gate 2 as summarised in Table 3-1. Through discussion and agreement with Thames Water, Southern Water and WRSE, we have considered 50, 80 and 120Ml/d scheme capacities for each of the preferred options.

Table 3-1: T2ST preferred options at Gate 2

Option	Description
B	Potable water transfer from land west of the A34 near Drayton to Southern Water's supply network in Hampshire. Route west of Newbury, remaining west of the A34. Water source from SESRO and/or STT.
C	Potable water transfer from land west of the A34 near Drayton to Southern Water's supply network in Hampshire. Route west of Newbury, crossing east of the A34. Water source from SESRO and/or STT.

3.2 Updated options appraisal

- 3.2.1 At the start of the Gate 2 assessment for T2ST in August 2021, we completed an options appraisal to address key questions concerning the viability and operation of the six options identified at Gate 1. We completed the Gate 2 options appraisal in December 2021. This involved a number of workshops with representatives from Thames Water, Southern Water and the T2ST project team. This appraisal process enabled us to make an informed decision on preferred options to take forward into the Gate 2 concept design stage that commenced in January 2022. The options appraisal methodology and conclusions of this work are documented within the Gate 2 Options Appraisal Report, provided as Annex A1.
- 3.2.2 The Gate 2 Options Appraisal Report concluded that the two Gate 1 potable T2ST options (Gate 1 Option 1: Culham to Otterbourne and Gate 1 Option 4: Reading to Otterbourne) should be taken forward into concept design. The four Gate 1 raw water transfer options, including the options to connect into Testwood Lakes, were screened out as part of the Gate 2 options appraisal process. The primary reasons for this were a combination of higher cost, environmental impact, feasibility issues with connecting into Testwood Lakes and Southern Water's strategy of focussing on Otterbourne Water Treatment Works (WTW) as the key treatment and resilience node for the Hampshire area.
- 3.2.3 After we had identified the two preferred T2ST potable options to take forward into the Gate 2 concept design stage (Options 1 and 4), we undertook a route and site selection process to establish preferred route corridors for both options. This work is documented within the Route and Site Assessment Report, provided as Annex A2. As a result of this process, we identified two preferred potable water options for T2ST (options B and C) to take forward to Gate 2 (as set out in Table 3-1). Options B and C have been developed as variants of Gate 1 Option 1: Culham to Otterbourne.
- 3.2.4 The planning risk between options B and C is considered to be similar and there was insufficient evidence to identify a single preferred option following completion of the route and site selection process and concept design.
- 3.2.5 We also developed Gate 1 Option 4, for a potable transfer from the River Thames upstream of Reading to Otterbourne, as part of the route and site selection process. However, as detailed in Annex A2, this option has been held back due to high planning risk associated with the construction of a new river intake on the south bank of the River Thames between Pangbourne and Reading, located within the North Wessex

Downs Area of Outstanding Natural Beauty (AONB), and planning constraints concerning the location of the associated WTW. The route and site selection work for this option also concluded that the overall pipeline length would be longer for this option than for options B and C and, therefore, the main advantage of this option from Gate 1 was no longer applicable.

3.2.6 We have undertaken the concept design of the T2ST preferred options B and C for Gate 2 in accordance with the All Company Working Group (ACWG) Design Principles, as set out in the Concept Design Report (see Annex A3), meeting the guidance criteria for Climate, People, Place and Value. These design principles will continue to shape the development of the T2ST design solution as work progresses through the gated process.

3.3 Configuration of preferred options

3.3.1 Figure 3-1 and Figure 3-2 show the indicative pipeline corridor routes of options B and C, together with indicative locations of other proposed infrastructure.

Figure 3-1: Preferred T2ST option B

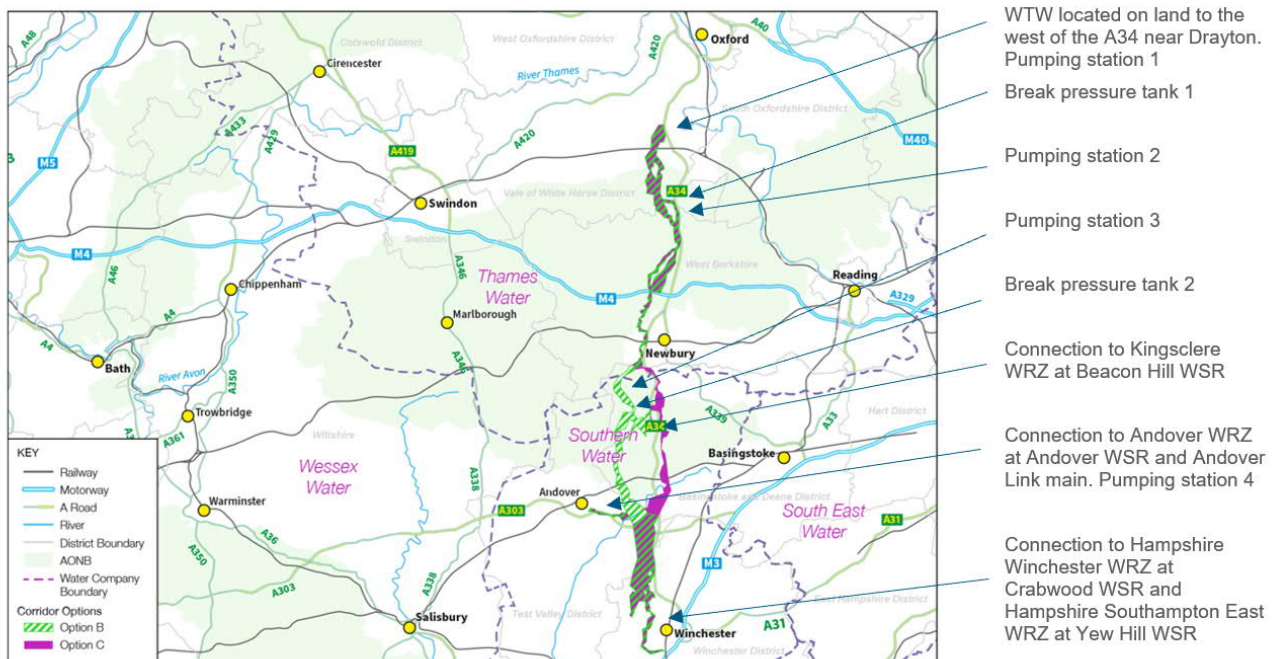
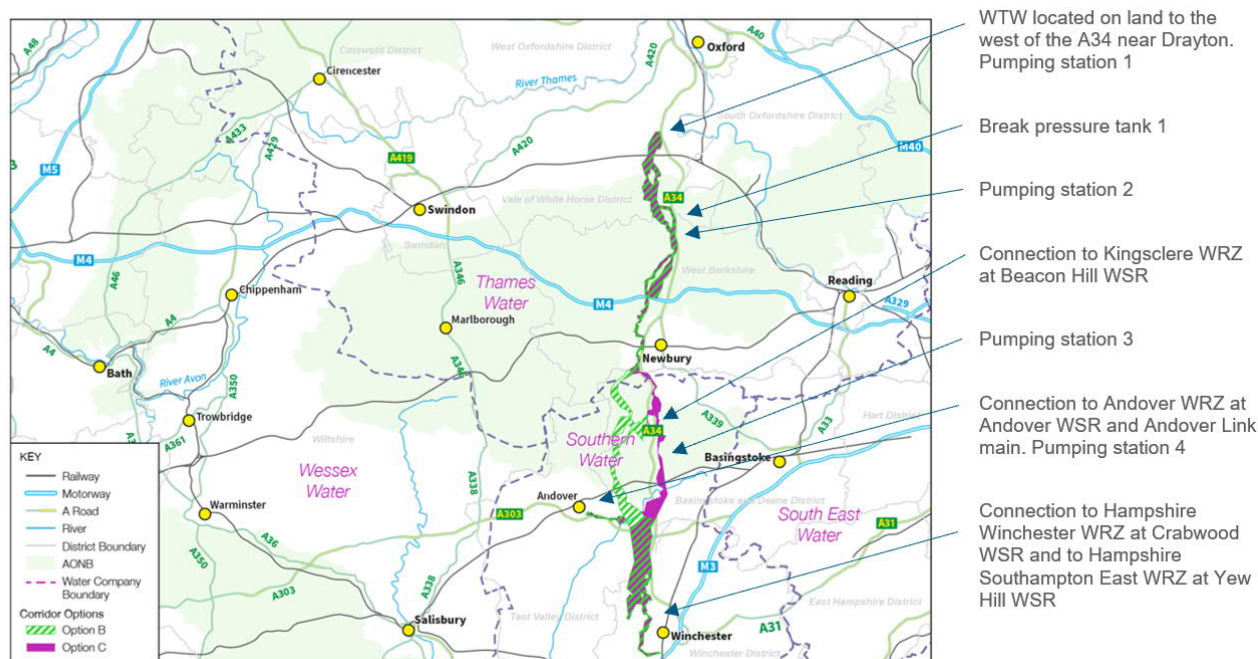


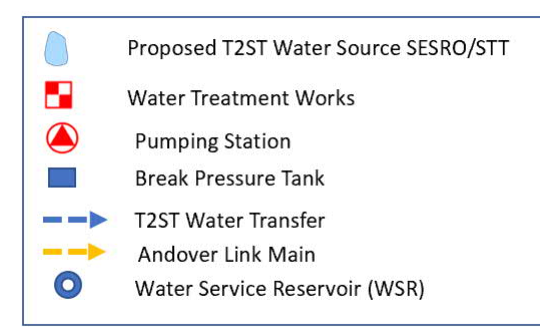
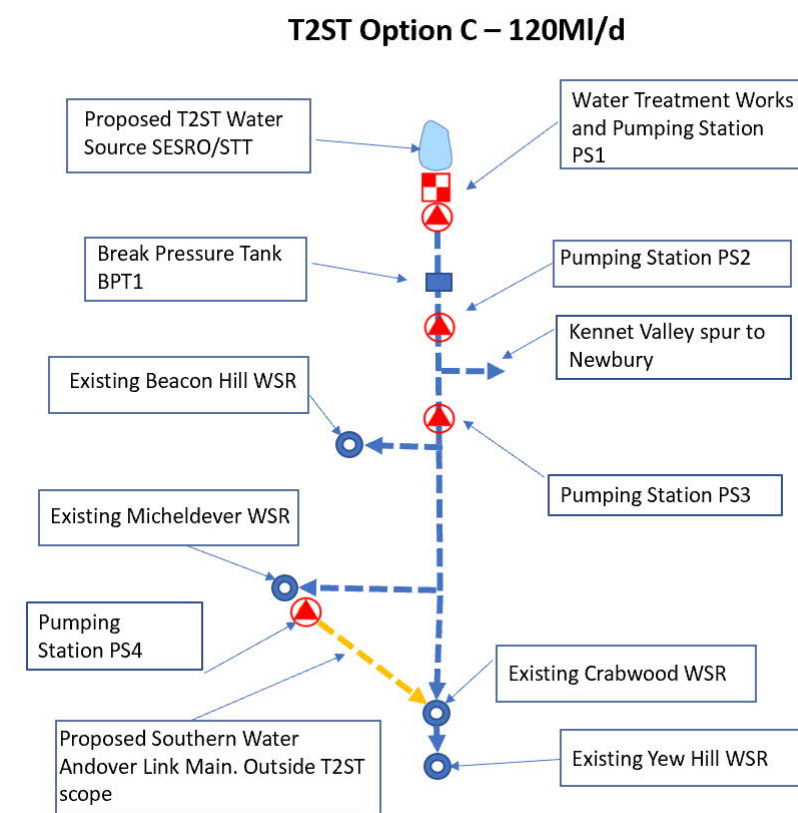
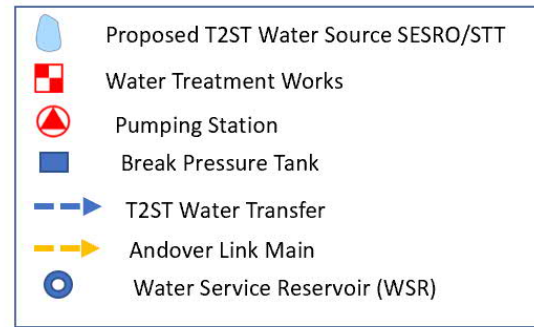
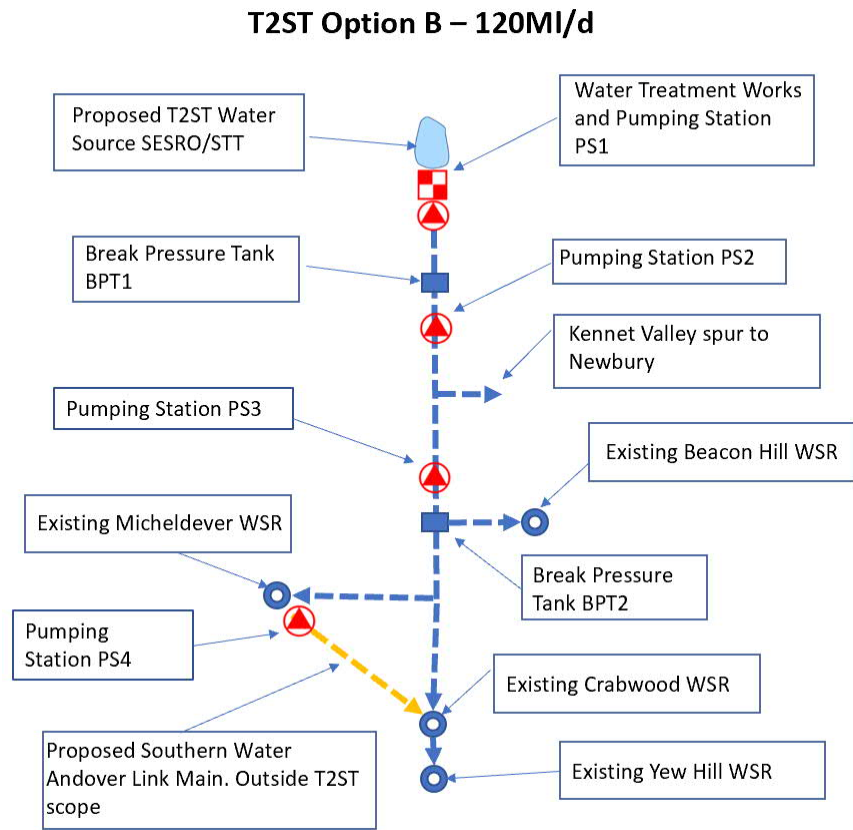
Figure 3-2: Preferred T2ST option C



3.4 Key assets

- 3.4.1 Both options comprise a water treatment works at the point of abstraction from SESRO and/or STT on land to the west of the A34 near Drayton to fully treat the source water prior to transfer to the Southern Water Hampshire supply network. Following treatment, potable water would then be transferred to the Southern Water Hampshire supply network through a ductile iron or welded steel pressure pipeline.
- 3.4.2 We have determined the treatment processes required for water treatment for T2ST in accordance with the ACWG Water Quality Risk Framework methodology. Details of the adopted approach are set out within the T2ST Gate 2 Water Quality Assessment Report (see Annex C) and summarised in Section 5.
- 3.4.3 A summary of infrastructure requirements for options B and C, including above ground assets and pipe lengths, is shown in Figure 3-3 at 120Ml/d capacity. Further design information including infrastructure requirements at 50Ml/d and 80Ml/d capacity for both options is provided in the concept design report (see Annex A3).
- 3.4.4 As shown in Figure 3-3 for option B at 120Ml/d capacity, a high lift pumping station would be required at the water treatment works site (PS1) with a further three intermediate pumping stations (PS2, PS3 and PS4). Two break pressure tanks would also be required (BPT1 and BPT2). The total number and length of major pipeline crossings for options B and C (tunnelled sections for roads, railways and rivers) is also shown. Details on the construction methodology for major crossings are provided within the concept design report (see Annex A3).

Figure 3-3: Schematic of options B and C at 120MI/d capacity



Section	Diameter (mm)	Length (km)	Capacity (MI/d)
PS1 to BPT1	1100	13.7	120
BPT2 to PS2	1000	4.3	120
PS2 to PS3	1000	25.0	120
PS3 to BPT2	1000	5.5	120
BPT2 to Beacon Hill WSR	250	1.8	5
BPT2 to Andover spur connection	1000	12.3	115
Andover spur to Micheldever WSR	700	7.0	45
Andover spur to Crabwood WSR	800	20.2	70
Crabwood WSR to Yew Hill WSR	800	3.8	70

Number of tunnelled crossings	Total tunnelled length (m)
26	3,225

Section	Diameter (mm)	Length (km)	Capacity (MI/d)
PS1 to BPT1	1100	13.7	120
BPT2 to PS2	1000	4.3	120
PS2 to PS3	1000	25.0	120
PS3 to Beacon Hill WSR	250	4.2	5
PS3 to Andover spur connection	1000	18.1	115
Andover spur to Micheldever WSR	700	9.2	45
Andover spur to Crabwood WSR	800	18.1	70
Crabwood WSR to Yew Hill WSR	800	3.8	70

Number of tunnelled crossings	Total tunnelled length (m)
32	4,524

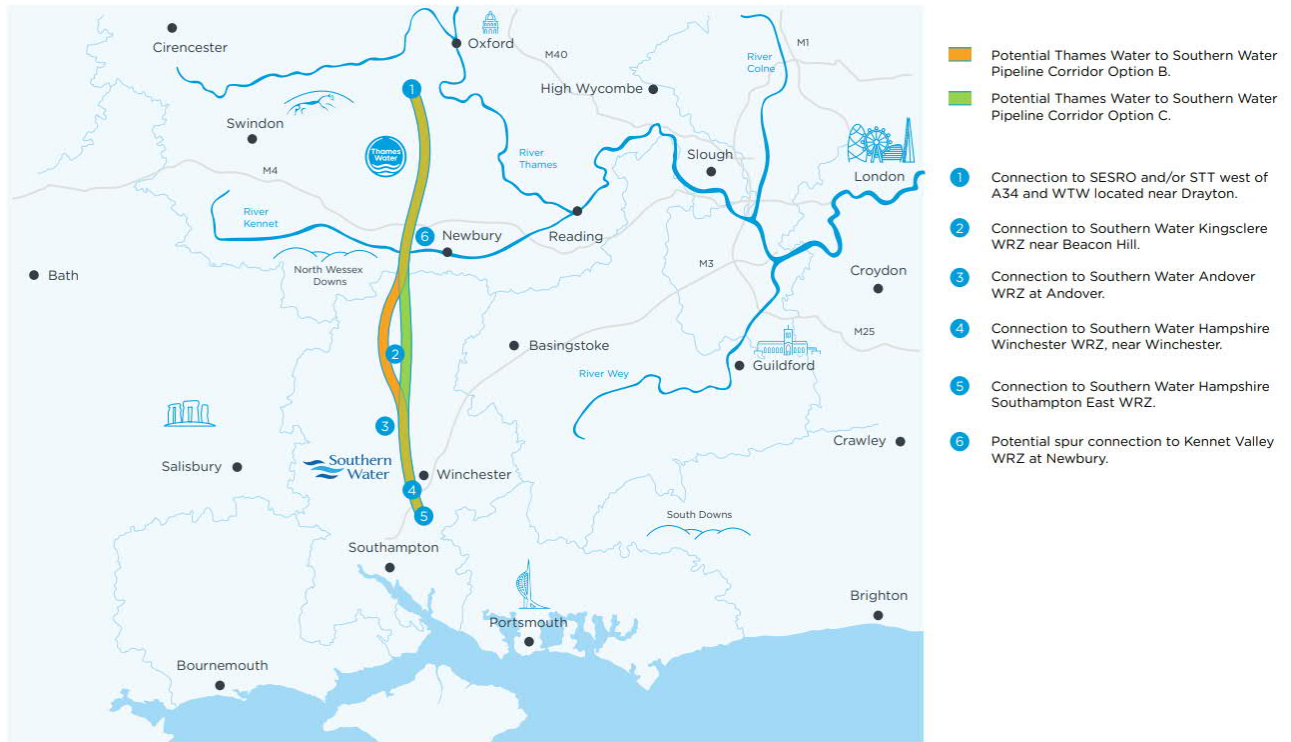
- 3.4.5 Option C is a variation of option B, the only differences being the pipe route through the central section to the south of Newbury, and location of break pressure tanks and pumping stations. This option would require a pumping station at the WTW, three intermediate pumping stations (PS2, PS3 and PS4) and one break pressure tank (BPT1), as shown in Figure 3-3.
- 3.4.6 Through discussion and agreement with the Southern Water water resources team, we have developed the following T2ST connections for Gate 2 with reference to the latest Southern Water demand forecasts for WRMP24:
- **Hampshire Winchester water resource zone (WRZ):** A direct connection from the T2ST main pipeline to the existing Crabwood Water Supply Reservoir (WSR) near Winchester (80 and 120Ml/d options).
 - **Hampshire Southampton East WRZ:** A direct connection from the T2ST main pipeline to the existing Yew Hill WSR near Winchester (80 and 120Ml/d options).
 - **Kingsclere WRZ:** A 5Ml/d spur connection from the T2ST transfer main has been provided for both options B and C to supply the existing Beacon Hill service reservoir within the Kingsclere WRZ.
 - **Andover WRZ:** A 45Ml/d spur connection from the T2ST transfer main has been provided for both options B and C to supply an existing service reservoir to the south-east of Andover on Micheldever Road. In drought conditions, T2ST could then supply 20Ml/d to meet the demand requirements of Andover, with the remaining 25Ml/d pumped from the Andover service reservoir to Crabwood service reservoir, through the proposed Andover Link Main pipeline that is planned for construction by Southern Water by 2027. The Andover Link Main pipeline is part of Southern Water's Water for Life enhancement of the Hampshire water supply grid in AMP8. Using the capacity of the proposed Andover Link Main as part of the T2ST Strategic Resource Option (SRO) would optimise the use of existing Southern Water assets and reduce the required capacity of the T2ST transfer main for the final section of pipeline between Andover and Yew Hill WSR.
- 3.4.7 The 5Ml/d and 45Ml/d spur connections are constant for all T2ST scheme capacities (50, 80 and 120Ml/d). This means that, for the T2ST 80Ml/d option, the capacity of the connection to Crabwood and Yew Hill is 30Ml/d, increasing to 70Ml/d for the T2ST 120Ml/d option. For the 50Ml/d option, all water is supplied to Beacon Hill and Andover water resource zones and there is no direct T2ST connection to Crabwood or Yew Hill service reservoirs.
- 3.4.8 The capacity of all T2ST connections will be reviewed again post-Gate 2 once final design sizing is confirmed for the proposed transfers. This will ensure consistency with the WRSE Regional Plan and Southern Water's WRMP24, the proposed Southern Water internal transfers (particularly the Andover Link Main) and further planned water resources modelling.
- 3.4.9 The route and site selection process used a web-based GIS system to map designated sites and key constraints. We then applied exclusionary criteria to avoid and take account of key constraints and designations to define potential pipeline corridor sections for assessment. Designations and constraints included ancient woodlands,

Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SACs), Special Protection Areas (SPAs), scheduled ancient monuments, development land and existing built infrastructure, such as roads, railways, towns and villages. The development of the pipeline corridors has also taken into account hydraulic requirements concerning the location of pumping stations and break pressure tanks, the location of major crossings and site access requirements during construction.

- 3.4.10 At this stage of the concept design, the pipe route corridors are preliminary to establish feasibility for the purposes of the Gate 2 submission. Further investigations and assessments will be required beyond Gate 2 to establish the final preferred T2ST option. This will include customer and stakeholder engagement on option selection and assessment, land referencing and an Environmental Impact Assessment (EIA) to support the eventual application for a Development Consent Order.
- 3.4.11 The option B pipeline route has a total pipe length of approximately 93.8km. From the water treatment works site on land to the west of the A34 near Drayton, the pipe route runs south, keeping to the west of the A34 to Newbury. The route then continues south to the west of Newbury and Highclere, keeping west of the A34, before connecting to Crabwood WSR and Yew Hill WSR near Winchester. Option B also includes spur connections to Beacon Hill WSR and Andover WSR.
- 3.4.12 The option C pipeline route has a total pipe length of approximately 94.2km. From the water treatment works site on land to the west of the A34 near Drayton, the pipe route runs south, keeping to the west of the A34 to Newbury – this section of the route is the same as option B. At Newbury, the pipe route crosses the A34 to the south of Newbury and then runs south to the east of the A34, before crossing back across the A34 to connect to Crabwood WSR and Yew Hill WSR. Option C also includes spur connections to Beacon Hill WSR and Andover WSR.
- 3.4.13 The pipeline route corridors for options B and C are shown together in Figure 3-4, which also shows the water company boundaries, the indicative location for the water treatment works, and proposed connection points to the Southern Water network.
- 3.4.14 Thames Water has also identified a potential spur connection from the T2ST pipeline to provide support to the Kennet Valley water resource zone at Newbury (10MI/d) and Reading (40MI/d). These options have been included in the WRSE modelling. The 10MI/d Newbury spur has been selected from 2040 at the earliest while the Reading spur has not been selected in the WRSE draft Regional Plan. The regional modelling of the spurs was finalised towards the end of this Gate 2 submission being closed out. Consequently, we have not included a detailed assessment of potential spurs to Reading or Newbury within the Gate 2 T2ST concept design or environmental assessments for preferred options B and C. The potential need for a spur connection to Kennet Valley will, however, be kept under review post-Gate 2 as the WRSE Regional Plan is finalised. In particular, a more detailed assessment of the Newbury spur (approximately 2km potable spur) will be undertaken after Gate 2.
- 3.4.15 South East Water (SEW) and WRSE have developed an option for a spur connection from the T2ST main pipeline to supply Northgate WSR to the south of Basingstoke, at

10MI/d and 20MI/d capacity. While WRSE has modelled this option, the offtake has not been selected in the WRSE draft Regional Plan. Therefore, no consideration of this spur has been included as part of the T2ST concept design for Gate 2. As for the potential Kennet Valley spur, a spur connection to SEW will also be kept under review post-Gate 2 as the Regional Plan is finalised.

Figure 3-4: Preferred T2ST options B and C



3.4.16 Details of the hydraulic analyses carried out for options B and C are provided within the Concept Design Report (see Annex A3), including lengths and diameters for each pipeline section, and pumping station power requirements.

Annex A3 also summarises major road, river and railway crossings for both options, including construction methodology and length of tunnelled sections. The number of tunnelled crossings for options B and C and tunnelled length is shown in Figure 3-3.

3.5 Interaction with other schemes

3.5.1 T2ST is dependent on the prior construction and commissioning of the South East Strategic Reservoir Option (SESRO) and/or the Severn Thames Transfer (STT) to provide a reliable water source for transfer to Southern Water's Hampshire supply area.

3.5.2 For the SESRO source scenario, water for T2ST would be provided from a connection within the SESRO pumping station. Within the SESRO pumping station, space has provisionally been provided for a set of low lift pumps to supply raw water from the reservoir to the T2ST water treatment works, located north of the pumping station, within the SESRO operational site area.

- 3.5.3 For the STT source scenario, the same location for the water treatment works is proposed on land to the west of the A34 near Drayton. The route of the proposed STT main passes approximately 2km to the north of the SESRO site prior to discharge to the River Thames at a new outfall near Culham. In this scenario, we would construct a pipeline connection from the STT main into the T2ST water treatment works. Treated water would then be pumped to Hampshire through the T2ST main as for the SESRO source option. At this stage of the T2ST concept design, we have not identified any advantage in moving the location of the T2ST water treatment works closer to the STT main. The proposed water treatment site, on land to the west of the A34 near Drayton, comprises flat, open, agricultural land with construction access from the A34.
- 3.5.4 In addition to T2ST interaction with SESRO and/or STT, the need and timing of T2ST will also depend on other schemes within Southern Water's supply area, including the AMP7/8 Water for Life Hampshire schemes and the Hampshire Water Transfer and Water Recycling Strategic Resource Option (SRO) scheme, as detailed in Section 4.1.5.

3.6 Flexibility, dependency and phasing

- 3.6.1 Depending on the final outcomes of the WRSE draft Regional Plan and WRMP processes, there may be scope for phased construction of the T2ST water treatment works, where separate treatment streams could be built and commissioned in stages to meet demand growth within the Southern Water supply area. There is also a requirement in the WRSE draft Regional Plan for a separate Thames Water water treatment works, located next to SESRO, to increase resilience of the Swindon and Oxfordshire WRZ. If both were to be progressed, then we would investigate the opportunities for synergies.
- 3.6.2 For the SESRO source scenario, there is the potential, subject to necessary consenting, for part of the T2ST main to be constructed at the same time as the SESRO works, between the proposed reservoir embankment and the A34. This has the potential to avoid future disturbance of the site, should T2ST be constructed some years after construction of SESRO.
- 3.6.3 The T2ST conveyance system, including pipeline sizing and capacity of break pressure tanks and pumping stations, will be designed and constructed to meet peak design capacity to avoid the need for laying additional pipelines and extensions to above ground infrastructure sites, reducing impact on landowners.
- 3.6.4 We have already identified an opportunity to use the proposed AMP7 Southern Water Andover Link Main pipeline to transfer T2ST water from Micheldever WSR to Crabwood during the concept design stage. This would provide connectivity with the Southern Water network and reduce the engineering scope of T2ST. Further opportunities to fully integrate T2ST with the Southern Water network are ongoing and we will continue to develop these post-Gate 2 to maximise efficiency of the transfer scheme.

3.7 Operation

- 3.7.1 We expect that, in normal year operation, T2ST will not be required to meet demand in

Hampshire and that the transfer will be operated at a minimum sweetening flow only to maintain water quality within the transfer system. We only expect the transfer to be required at peak flow at times of extreme drought.

- 3.7.2 During times of normal operation in normal weather years, when T2ST will not be required by Southern Water to meet customer demand, it will be necessary to minimise the sweetening flow through the pipeline and storage tanks to minimise operational expenditure (opex). The sweetening flow received by Southern Water will need to be blended with local sources within the receiving service reservoirs, and abstraction from local resources in Hampshire reduced accordingly. Given the length of the T2ST transfer, the operational cost of the T2ST water will be higher than that of local Southern Water sources. Therefore, the sweetening flow will need to be turned down to a minimum level to maintain the quality of water within the T2ST transmission main and on-line storage tanks.
- 3.7.3 For costing purposes for Gate 2, we have adopted the lower sweetening flow of 15% for Gate 2 to minimise the operating costs of the transfer in a normal operating year, as agreed with Southern Water at this stage of the scheme development. A 15% sweetening flow can be accommodated within the design of the water treatment works but will need to be determined at the outset of outline and detailed design to ensure this is taken into account in the design of treatment processes and pumping and dosing equipment. Further work to confirm the final sweetening flow requirements will be required post-Gate 2, once the scheme capacity and utilisation of T2ST has been finalised, to minimise the whole life cost.

4. Water resource assessment

4.1 Utilisation

- 4.1.1 In view of uncertainties regarding the need and timing of T2ST, Thames Water and Southern Water agreed at the commencement of the Gate 2 concept design stage that a range of T2ST option capacities should be assessed at 50, 80 and 120MI/d.
- 4.1.2 WRSE's emerging Regional Plan (January 2022) identified that T2ST, at a maximum capacity of 80MI/d, may be required by 2049 under the emerging plan's high adaptive planning pathway.
- 4.1.3 WRSE and the water companies have subsequently undertaken extensive modelling to inform the draft Regional Plan. This latest work shows a need for a T2ST scheme of up to 120MI/d by 2040-2053 with the timing and utilisation depending on the adaptive plan scenario selected. This is the basis on which T2ST has been identified in the WRSE draft Regional Plan and draft WRMPs for consultation in November 2022.
- 4.1.4 There are a number of strategic resource schemes in the Hampshire region within the WRSE modelling, or schemes being implemented through WRMP19, that could affect the need and timing of T2ST. These are set out in Table 4-1.

Table 4-1: Interrelated schemes affecting need and timing of T2ST

Scheme	Description and interaction with T2ST	Earliest potential construction completion	Planning stage
SESRO	South East Strategic Reservoir Option. New reservoir development near Abingdon. Potential water source for T2ST	2038	SRO Gate 2 November 2022
STT	River Severn to River Thames Transfer. Potential water source for T2ST	2033	SRO Gate 2 November 2022
Havant Thicket Reservoir	Treated water transfer from Havant Thicket to Gaters Mill. Transfer from Portsmouth Water to Southern Water that could affect timing and capacity of T2ST	Southern Water's WRMP19 option for potential construction within AMP8 by 2029	Reservoir planning consent implementation commenced in 2022
Southampton Link Main	New 60Ml/d potable water main from Otterbourne (Yewhill WSR) to Testwood (Rownhams WSR), within Southern Water supply area, which would transfer the T2ST water to the Hampshire Southampton West Water Resource Zone	Southern Water's WRMP19 option with planned construction by 2027	Non-SRO scheme Currently starting on site surveys (Engineering, Environmental, Archaeological etc) Construction start planned for late 2024
Andover Link Main	15Ml/d potable water main from Otterbourne to Andover (via Yewhill WSR). Transfer pipeline could be utilised by T2ST scheme. The first section, from Otterbourne to Yewhill WSR, would be used in reverse to transfer water from T2ST to the Hampshire Southampton East Water Resource Zone	Southern Water's WRMP19 option with planned construction by 2027	Non-SRO scheme Implementation to commence in AMP7 Currently starting on site surveys (Engineering, Environmental, Archaeological etc) Construction start planned for late 2024
Hampshire Water Transfer and Water Recycling Project	Raw water transfer to Otterbourne WTW. Transfer from Portsmouth Water to Southern Water that could affect timing and capacity of T2ST	Southern Water's WRMP19 option with planned construction by 2027	Non-statutory consultation for DCO commenced in July 2022 DCO submission expected 2024

4.1.5 The utilisation of T2ST during drought events will be confirmed by a water resources model of the Hampshire supply area that is being developed and run by Southern Water and Portsmouth Water. We expect outputs from this model to be available from the autumn of 2022 and will provide detailed utilisation data to inform the further development of the preferred T2ST option beyond Gate 2. This will further inform the revised draft WRMPs and the Regional Plan.

4.2 Water resources benefit

4.2.1 As part of the T2ST Gate 2 submission, we have undertaken an assessment of the deployable output (DO) benefits of T2ST using a Pywr water resources model, as summarised in the Concept Design Report (see Annex A3). The key focus of this

assessment was to establish whether there is likely to be ‘conjunctive use’ DO benefit through a link between the River Thames and Southern Water’s Hampshire supply area. That is, if the DO benefit of the transfer scheme to Southern Water is greater than the loss of DO to Thames Water (the ‘disbenefit’) from implementing the T2ST scheme. Conjunctive use benefit is dependent on the different characteristics of the Thames Water and Southern Water systems, including potential incoherence of timing or impact of extreme droughts in the geographically separate River Thames and Itchen systems, and differences in the drought vulnerability of the two supply systems.

- 4.2.2 This work concludes that the net conjunctive use benefit of T2ST is around 34MI/d for T2ST scheme capacity of 80MI/d at a 1:500 return period, increasing to a conjunctive use benefit of 48MI/d for scheme capacity of 120MI/d.
- 4.2.3 We have also undertaken DO modelling to investigate conjunctive use benefits of linking SESRO with T2ST, should SESRO and STT both be constructed. This work has shown that if SESRO and STT are combined, then this could result in a net DO benefit of 19 MI/d when combined with T2ST, compared to separate operation. Therefore, should both schemes be selected in the Regional Plan, joining SESRO and STT would provide a greater level of resilience to Southern Water’s Hampshire zone.

4.3 Long-term opportunities and scalability

- 4.3.1 As set out in Section 2, we expect the T2ST conveyance system, including pipeline sizing and capacity of break pressure tanks and pumping stations, to be designed and constructed at peak design capacity. This is to avoid the need for laying additional pipelines and extensions to above ground infrastructure sites and, therefore, reducing impact on landowners. There will be opportunities to phase the construction of the water treatment works once the final utilisation of the T2ST scheme has been determined from the Regional Plan and ongoing Pywr water resource modelling of the Southern Water area. Further detailed work post-Gate 2 will be required to optimise the T2ST pipe diameter, taking into account whole life costs at average and peak flow conditions and sweetening flow requirements.

4.4 Infrastructure resilience to the risk of flooding

- 4.4.1 The T2ST transfer scheme would have a high resilience to the risk of flooding. Through the site and route selection process, we have selected the location of above ground infrastructure, including break pressure tanks and pumping stations, for both preferred options B and C to be outside of Flood Risk Zone 2. These sites would have less than a 1:100 year risk of fluvial and surface water flooding.
- 4.4.2 The indicative location of the new WTW at the intake location included in the Gate 2 Environmental Assessment is partly located on Flood Zone 2 and 3. However, there is an opportunity to move the new WTW to just outside Flood Zones 2 and 3 to avoid the requirement to provide compensatory flood storage to reduce the risk of flooding to the asset and avoid the need for additional land to provide compensatory flood storage. There is no space constraint for locating the WTW outside of flood risk zone 2

and 3 and this will be taken forward as the design is developed post-Gate 2.

- 4.4.3 We will design the buried transfer pipelines to maintain a positive working pressure along the length of the transfer pipeline between the abstraction from SESRO and/or STT and connection to the Southern Water supply network. The design will ensure that the hydraulic grade line of the transfer system, under all operating scenarios, will be above maximum historic flood levels to avoid any risk of water ingress to the treated water system in accordance with standard industry practice.

5. Drinking water quality considerations

5.1 Summary of drinking water quality considerations

- 5.1.1 The approach for the T2ST water quality assessment for Gate 2 follows the All Company Working Group (ACWG) methodology to ensure a consistent process of reviewing the strategic water quality risks. This methodology has been created in accordance with the Drinking Water Inspectorate (DWI) planning requirements, to follow global best practice in Drinking Water Safety Planning, and in alignment with the UK Regulatory Framework and emerging water quality considerations. The T2ST water quality risk assessment report is provided as Annex C.
- 5.1.2 Both of the T2ST preferred options B and C at Gate 2 may be supplied by several different water sources, each with differing water quality risk profiles. These include raw water abstracted directly from SESRO or STT. At this stage, the water quality risk assessment has been based on either STT or SESRO, not a combination of both sources. Further work to look at a combined SESRO and STT scenario can be considered in future as the scheme design develops.
- 5.1.3 Therefore, to undertake a source-to-tap water safety risk assessment, we defined four water source scenarios for Gate 2, each with varying risk profiles:
1. Abstraction from SESRO – sourced from the River Thames at Culham at high flow.
 2. Abstraction from STT– flows sourced directly from the River Severn (STT) with pipeline conveyance.
 3. Abstraction from STT– flows sourced directly from the River Severn (STT) with canal conveyance.
 4. Abstraction from STT– flows sourced directly from the River Severn (STT) with support from wastewater treatment works (WwTW) effluent (conveyance by either pipeline or canal).
- 5.1.4 All STT scenarios include flow support to ensure that design flows can be maintained during periods of low flow within the River Severn. Water source scenarios 2 and 3 are supported by flow releases from Lake Vyrnwy to the upper River Severn catchment. Water source scenario 4 receives flow support from both Lake Vyrnwy and treated effluent from Minworth WwTW. Only ‘supported’ options have been considered for the T2ST source to ensure continuity of supply for operation of the transfer.

- 5.1.5 We identified the key drinking water quality risks ('limiting hazards') associated with each source scenario 1-4 through a workshop with Thames Water and Southern Water following the ACWG methodology. We developed water quality risk assessments for each water source scenario based on Drinking Water Safety Plans (DWSPs), water quality monitoring data from the latest Gate 2 monitoring programme, and updated SESRO and STT Water Quality Risk Assessments (WQRAs).
- 5.1.6 We have identified proposed potable water treatment processes for each water source scenario 1-4 as set out in Annex C. The source water scenarios result in differing risks and limiting hazards, which drive different selections of treatment processes in order to mitigate the expected risks associated with each water source.
- 5.1.7 Based on the updated WQRAs, the highest risk water source is water source scenario 4 (STT), which includes planned indirect support from treated wastewater effluent. This may give rise to increased microbiological risks as well as increased risks of endocrine disrupting compounds from pharmaceutical and personal care products.
- 5.1.8 The water quality risk assessments have shown that water source scenarios 2 and 3 (STT) are slightly more favourable than water source scenario 4 due to the microbiological risks associated with Minworth WwTW effluent. Water source scenario 1 for abstraction from SESRO presents the lowest drinking water quality risk.
- 5.1.9 We revised the risk assessments for each water source following the Gate 2 ACWG WQRA workshop and identified the limiting hazards and control methods in place for each risk. The Gate 2 process has identified new water quality risks for all water source scenarios having reviewed water quality monitoring data provided by the Gate 2 monitoring programme. The monitoring programme to date has provided a small sample of data to help quantify the magnitude and likelihood of risks in both the SESRO and STT scenarios. While continued monitoring is required to provide a full understanding of trends in the water quality profile, the data to date gives some indication of the risks and is, at present, the most up to date source of information.
- 5.1.10 In all options and water source scenarios, treated water from new surface water sources will be introduced to new regions, including the currently groundwater-fed areas of Kingsclere and Andover. Changes in water source can affect aesthetic risks, such as taste and odour, as well as corrosivity. These risks will require closer investigation during subsequent phases of work. Potential control measures include pro-active consumer engagement, however there may also be a requirement for additional chemical conditioning prior to entering supply. Further work to establish the need for, and nature of, such conditioning will be required post-Gate 2.

6. Environmental assessment

6.1 Overview

- 6.1.1 This section describes the work undertaken to assess the environmental feasibility of T2ST. Following completion of an updated options appraisal, route and site selection

process and concept design, we have developed two preferred options – options B and C – for T2ST at Gate 2.

- 6.1.2 We have appraised the environmental and social risks and impacts of the two options. This work has been supplemented by specific assessments, including a Water Framework Directive (WFD) assessment, an informal Habitats Regulations Assessment (HRA), an Invasive Non-Native Species (INNS) risk assessment, and assessments of natural capital, biodiversity net gain and carbon.
- 6.1.3 Although Strategic Environmental Assessment (SEA) of T2ST is more appropriately conducted at the WRMP and Regional Plan level, an SEA level assessment has been applied to the options. The SEA has been undertaken primarily to provide consistency of information on the T2ST options for use in the SEAs for WRMP and the Regional Plan. Environmental effects of T2ST are reported in the Environmental Assessment Report (Annex B1).
- 6.1.4 In applying the Environmental Assessments to the route corridors and sites comprising the preferred options, we identified a number of constraints and issues for further investigation and work. However, the assessments did not identify any environmental risks where mitigation could not be provided and the viability of the T2ST scheme would be affected.

6.2 Water Framework Directive assessment

- 6.2.1 The Water Framework Directive (WFD) assessment reports the findings of the Level 1 and Level 2 assessments, consistent with the All Company Working Group (ACWG) framework for undertaking WFD assessments for Strategic Resource Options (SROs).
- 6.2.2 The WFD requires that waterbodies experience no deterioration in status. Overall good status is a function of good ecological status (biological, physico-chemical and hydromorphological elements and specific pollutants) and good chemical status (priority substances and priority hazardous substances). The WFD report assesses the potential impacts of the options on all potentially affected waterbodies.
- 6.2.3 We assessed multiple waterbodies identified at Gate 1 during the Gate 2 Level 1 screening assessment, with further design development work refining this list. This means that 24 WFD river and groundwater bodies were identified for Level 1 screening. Overall, the Gate 2 Level 1 WFD assessment indicated that for both option B and option C, 16 out of 24 waterbodies could be screened out as not requiring further assessment, and eight waterbodies remained after the screening process. Those remaining, therefore, required further assessment.
- 6.2.4 For option B, the Level 2 assessment considered whether the scheme will have a direct impact on WFD supporting conditions as part of the scheme in one waterbody (River Test Chalk). The findings indicate that there are potential WFD compliance risks associated with the operation of the scheme, due to the works taking place adjacent to, and potentially within, the River Test Site of Special Scientific Interest (SSSI), which is also a Groundwater Dependent Terrestrial Ecosystem (GWDTE), and East Aston Common SSSI & GWDTE.

- 6.2.5 Similarly for option C, the findings indicate that there are potential WFD compliance risks associated with the operation of the scheme, due to the works taking place adjacent to, and potentially within, the River Test SSSI & GWDTE, East Aston Common SSSI & GWDTE and Bere Mill Meadows SSSI & GWDTE.
- 6.2.6 For both of the options, we anticipate that impacts can be minimised through design and mitigation, which might include returning groundwater abstracted during temporary construction dewatering back into the ground to help maintain groundwater levels, or additional measures, such as gravel beds and clay stanks, to minimise the disruption to groundwater flow paths from the presence of the pipeline.
- 6.2.7 If mitigation measures are followed, we predict no adverse, permanent impacts on the water environment.
- 6.2.8 Further WFD assessment would be required for further work on the design beyond Gate 2, and for future planning/consent applications, to improve the confidence and certainty of WFD risks outlined in the Gate 2 WFD Level 2 assessments.
- 6.2.9 Areas for further assessment include:
- i. Hydroecological risk assessments into the impact of construction dewatering on groundwater levels, and potential implications on watercourses and GWDTE of Kennet and Lambourn Floodplains SSSI, Kennet Valley Alderwoods SSSI, River Test SSSI, East Aston Common SSSI and Bere Mill Meadows SSSI
 - ii. If dewatering is discharged to surface watercourses to help maintain flow, there is the potential for short-term impacts on water quality. Water quality analysis is required to understand the relative quality of groundwater and surface water in these areas and identify the significance of any changes in water quality in the watercourses
 - iii. Detailed hydrological assessment of the impacts of changes in groundwater levels due to construction dewatering on flow in the chalk streams and GWDTE which it supports
 - iv. Consideration of pipejack or micro tunnel crossings for the more sensitive ordinary watercourses
 - v. Additional groundwater investigation to understand groundwater levels across the route and how they interact with the pipeline during operation of the scheme. Further investigation should consider where groundwater levels are likely to intersect with the pipeline, calculation of whether the pipeline could form a barrier to groundwater flow (and potential to increase flood risk) and identification of additional mitigation if required
- 6.2.10 We expect additional mitigation measures, such as best practice dewatering methods and best practice water pollution control measures, to lead to no adverse effect on the water environment.

6.3 Informal Habitats Regulations Assessment

- 6.3.1 The informal Habitats Regulations Assessment (HRA) reports the findings of the HRA Stage 2/Appropriate Assessment (AA), undertaken at plan level for the two T2ST options, and assesses the potential impacts of the options on Natura 2000 sites and the UK's National Site Network and Ramsar sites. These sites are collectively referred

to as ‘Habitats Sites’.

- 6.3.2 The HRA screening identified a number of potential ‘likely significant effects’ and a number of ‘uncertain effects’ for each of the options. Following the AA, no adverse effects resulting from the implementation of option B (alone and in-combination with other projects or plans) or Option C (alone and in-combination with other projects or plans) are reasonably foreseeable on the integrity of the Habitats Sites, if the best practice construction measures and the suggested mitigation measures are observed.
- 6.3.3 The current design of both options includes a pipeline route that will cross watercourses that are designated as a Habitats Site (River Lambourn Special Area of Conservation (SAC) in options B and C). The identified result of ‘no likely significant effects’ depends on the implementation of the proposed mitigation measures, including use of pipejack or micro tunnel crossings in all options, to avoid effects on watercourses.
- 6.3.4 Standard best practice pollution control measures and biosecurity measures should be put in place. Other measures to avoid impacts include future work to identify mature tree lines or hedgerows that might be crossed by the route and either preserve these in situ (such as through pipejacking beneath the hedge) or immediately reinstate to avoid effects on bats.
- 6.3.5 We have identified other mitigation measures to avoid disturbance from light, noise and visual impacts. We anticipate that a Construction Environmental Management Plan (CEMP) will be developed at the appropriate stage in the scheme development, which will include the mitigation measures described in the informal HRA, as well as any other specific measures identified following further assessment or formal HRA.
- 6.3.6 We have identified no adverse effects to the site integrity resulting from the implementation of either option B or option C, and any residual effects are considered negligible. Consequently, an in-combination assessment with other projects or plans is not required.
- 6.3.7 This assessment must be revised if further design iterations result in changes to potential impact pathways and potential significant effects on Habitats Sites. This would be undertaken as part of a formal HRA to be completed at the appropriate stage of design, in accordance with the consenting regime.

6.4 Environmental appraisal

- 6.4.1 Following the options appraisal and refinement process, we undertook a desk-based appraisal to identify potential impacts on the environment from the pipeline corridors and above ground infrastructure required as part of T2ST. The results of the regulatory assessments fed into the environmental appraisal.
- 6.4.2 In applying the environmental assessments to the route corridors and sites comprising the preferred options, we identified a number of constraints and issues for further investigation and work. However, the assessments did not identify any significant environmental risks where mitigation could not be provided and the viability of the T2ST scheme would be affected.

- 6.4.3 Constraints and issues identified include the potential for impacts on sensitive habitats, including several SSSIs (some of which are also GWDTE), SACs and Local Wildlife Sites (LWS) and some priority habitats and species. The proposed pipeline intersects Source Protection Zones (SPZs), including five SPZ1s. The indicative location of the new water treatment works (WTW) at the intake location included in the Gate 2 Environmental Assessment is partly located on Flood Zones 2 and 3. However, there is an opportunity to move the new WTW to just outside Flood Zones 2 and 3 to avoid the requirement to provide compensatory flood storage to reduce the risk of flooding to the asset and avoid the need for additional land to provide compensatory flood storage. There is no space constraint for locating the WTW outside of flood risk zones 2 and 3 and this will be taken forward as the design is developed post-Gate 2.
- 6.4.4 Temporary construction activity and intermittent operational activity is likely to affect tranquillity within the North Wessex Downs Area of Outstanding Natural Beauty (AONB) which is noted for its quiet rural character. We expect that, during construction, the temporary diversion or closure of several footpaths and cycleways would temporarily reduce recreational connectivity.
- 6.4.5 In terms of historic environment, the impacts of the preferred options are minor and temporary, mainly affecting conservation areas and non-designated assets, although one scheduled monument has the potential to be temporarily impacted. The setting of several Grade II listed buildings could also be affected.
- 6.4.6 The preferred options avoid the requirement for land affecting residential property, business premises and community facilities. There may be some temporary impacts on the amenity of those close to construction activity and from temporary disturbance to Public Rights of Way. The preferred options also involve crossing transport and utility infrastructure, as well as historic landfills and one active landfill (option B only).
- 6.4.7 Potential high-risk issues identified at this stage include the crossing of an active landfill site in option B (Cliffeville landfill), potential impacts on SSSI GWDTE (both options, but an additional one for option C) and loss of ancient woodland (both options, but higher risk in option C). However, no significant environmental issues have been identified at this stage where mitigation could not be provided and the viability of the T2ST scheme would be affected.
- 6.4.8 We recommend that future work focusses on some of those areas of the proposed route where the constraints are the greatest. This includes looking at areas where the pipeline corridor is at its most narrow, to ensure the risks to routing are identified and managed. This also includes further consideration of how the pipeline route will cross main and ordinary watercourses and addressing construction challenges in complex landscapes, such as the Kennet and Lambourn valleys.

6.5 Other environmental considerations

- 6.5.1 We have investigated the risk of the options spreading invasive non-native species (INNS). The INNS risk assessment identified that the risk of spreading INNS is the

same for both options B and C. The proposed transfers will introduce a new hydrological connection between previously isolated catchments. T2ST involves the transfer of treated water from a WTW to an enclosed water supply reservoir (WSR). At no point during the normal operation of the transfer will raw or treated water be discharged to an open waterbody. Therefore, there is no risk of INNS introduction to the receptor catchment. However, we think that the movement of personnel and vehicles from the WTW following contact with raw water at the intake location prior to transfer will be the most likely pathway of INNS spread associated with the T2ST Strategic Resource Option (SRO). Biosecurity measures can be put in place to mitigate against this risk. We have already incorporated biosecurity measures into aspects of the design, and this will need to continue as the design develops.

- 6.5.2 The Natural Capital Assessment (NCA) identified that the preferred options will likely cause the temporary and permanent loss of natural capital stocks during construction. Stocks that are likely to be permanently lost include arable land, pasture, other semi-natural grassland and active floodplain. However, best practice mitigation (such as pipejack or micro tunnel crossings) and reinstatement/compensation of habitat means that most natural capital stocks post-construction will have no to little change. The NCA has identified that pipeline routes through the route corridors exist that avoid the majority of impacts on ancient woodland. These findings are expected to inform future design development.
- 6.5.3 The assessment of biodiversity net gain (BNG) calculates that somewhere in the range of 240–260 BNG habitat units would be lost due to the temporary removal of habitats during construction. The routes present an opportunity to achieve BNG and improve the existing habitats through post-construction remediation and replacement of low value habitats with higher value habitats. The route option crosses several priority habitats, Network Enhancement Zones, Fragmentation Action Zones and Network Expansion Zones and is, therefore, suitable for the planting of new high value habitats.
- 6.5.4 We have reviewed the wider benefits that are predicted to arise from implementing the T2ST SRO options. The wider benefits are those areas of environmental and social value that are associated with constructing and operating the scheme. We expect beneficial economic impacts associated with new operational phase jobs to generate approximately £22 million (over the 30-year appraisal period). Proposals to enhance green infrastructure links and local footpaths could lead to health and wellbeing benefits.

6.6 Carbon

- 6.6.1 English water companies have made a commitment to be a net zero operational carbon sector by 2030. Thames Water⁴ and Southern Water⁵ have both signed up to this commitment. Thames Water has, additionally, made a commitment to go beyond net zero by 2040.

⁴ Link to [Climate Change | Responsibility | About us | Thames Water](#)

⁵ Link to [Carbon emissions \(southernwater.co.uk\)](#)

- 6.6.2 Reducing whole life carbon is an important aspiration and we have investigated opportunities to do this. The concept design has sought to minimise the pipeline length (while avoiding designated sites) to reduce material quantities and associated capital carbon during construction. Reducing the pipeline length also has benefits in reducing pumping head and operational carbon. In future design stages, the pipeline diameter and pumping regime for T2ST will also be optimised, once the scheme utilisation has been finalised, to minimise both capital and operational carbon. We will also explore opportunities for renewable power generation including wind, solar and hydro power as part of the T2ST scheme, taking into account environmental designations including the AONB.
- 6.6.3 The estimations of carbon costs show that the estimated carbon capital and operational carbon impacts for the T2ST transfer options B and C are relatively similar. The estimated capital carbon (in tCO₂e) required for the 80MI/d and 120MI/d options is similar for both transfer options B and C, although the 50MI/d option is somewhat higher for option C. Operational carbon is similar for both route options, but higher for option B than option C. Whole life carbon and the monetised carbon values are also similar for both route options, with the 50MI/d option being higher for option C, and the 80 MI/d and 120MI/d options being higher for option B.
- 6.6.4 We have identified some positive considerations that the T2ST transfer options could take to decarbonise and drive towards net zero. An important part of turning some of these considerations into deliverable opportunities is to have a robust carbon management process embedded into the scheme development.
- 6.6.5 Capital carbon and operational carbon for each of the preferred options B and C are presented in the Costs and Carbon Report (see Annex A4) and summarised in Table 6-1. We have undertaken carbon modelling for each preferred option for both capital carbon and operational carbon. We have derived capital carbon based on the conceptual design scope of each option and applied capital carbon models, depending on the type of asset and its carbon emissions. We have estimated operational carbon emissions based on power, chemical use and operational maintenance estimates for each option. Whole life carbon estimates comprise the capital carbon emissions, annual operational emissions and additional emissions associated with capital maintenance.

Table 6-1: Capital, operational and whole life carbon estimates (monetised costs in 2020/21 prices)

Operating regime	Flow (Ml/d)	Capital carbon (tCO ₂ e)	Operational carbon (tCO ₂ e/y)	Whole life carbon (tCO ₂ e)	Monetised whole life cost of carbon (£m)
Route B Options					
Max (DO)	50	62,400	1,083	154,100	28
Min (15% of DO)	7.5	62,400	313	104,000	21
Max (DO)	80	101,400	1,766	245,700	46
Min (15% of DO)	12	101,400	506	160,300	34
Max (DO)	120	130,800	2,635	340,500	62
Min (15% of DO)	18	130,800	756	218,300	45
Route C Options					
Max (DO)	50	67,000	1,049	156,200	29
Min (15% of DO)	7.5	67,000	308	107,800	22
Max (DO)	80	102,700	1,706	242,400	45
Min (15% of DO)	12	102,700	497	163,600	34
Max (DO)	120	129,500	2,580	334,700	61
Min (15% of DO)	18	129,500	748	215,400	44

7. Programme and planning

7.1 Project delivery plan

7.1.1 We have developed a project delivery plan for the preferred T2ST options from Gate 2 through to commissioning based on an earliest need for the scheme in 2040. The project delivery plan is summarised in Figure 7-1. The proposed project phases are set out in Table 7-1 below.

7.1.2 The overall delivery of T2ST has interdependencies with a multitude of factors, including:

1. Regional water resource modelling, specifically making the case for the transfer, including the size and timing of the need.
2. The delivery of other schemes, including other Strategic Resource Options (SROs), as well as regional connections, particularly the required sources of water.
3. Government policy, including Defra's future publication of a National Policy Statement on Water Resources Infrastructure.
4. Statutory Water Resource Management Plans (WRMPs).
5. The Regulators' Alliance for Progressing Infrastructure Development (RAPID) gated process.

6. The overall procurement for delivery of the scheme.
7. Ofwat's standard process and control points for Direct Procurement for Customers (DPC), if that is the preferred procurement strategy.

7.1.3 These dependencies are shown in more detail in Annex F: Project Delivery Plan.

Table 7-1: T2ST generic project phasing

Phase	Name	Outcome required
1	Gate 1	<ul style="list-style-type: none"> • RAPID Gate 1 submission
2	Gate 2	<ul style="list-style-type: none"> • RAPID Gate 2 submission
3	Gate 3	<ul style="list-style-type: none"> • RAPID Gate 3 submission • Planning Inspectorate (PINS) provides Environmental Impact Assessment (EIA) Scoping Opinion • Undertake initial non-statutory consultation(s) on the Development Consent Order (DCO) project • Ofwat Control Point C (for DPC) approved
4	Gate 4	<ul style="list-style-type: none"> • RAPID Gate 4 submission • Complete Preliminary Environmental Information Report (PEIR) • Complete statutory public consultation on the DCO project • Ofwat Control Points D and E (for DPC) approved • Partner company approval to submit DCO application
5	DCO Examination and approval	<ul style="list-style-type: none"> • DCO Examination • Secretary of State's award of DCO
6	Contract award	<ul style="list-style-type: none"> • Ofwat Control Point F (for DPC) approved • Competitively Appointed Provider (CAP) awarded contract for delivery • Land acquisition contracts completed
7	Construction	<ul style="list-style-type: none"> • Scheme commissioned and operational

7.1.4 The source of water for the scheme will be the South East Strategic Reservoir Option (SESRO) and/or Severn Thames Transfer (STT). The earliest operational date of SESRO is estimated to be 2038, while the earliest a STT option could be operational is in 2033.

7.1.5 The WRSE draft Regional Plan sets out the overall need for T2ST and this feeds into Thames Water and Southern Water's WRMPs. The WRSE draft Regional Plan has determined a need for a T2ST scheme of up to 120MI/d by 2040-2053 depending on the scenario in the adaptive plan.

7.1.6 We have considered phasing of the scheme and will look at this in more detail beyond Gate 2 when the timing and operation of the T2ST scheme is confirmed. This could include a water treatment works (WTW) with less than 120 MI/d capacity that could be adapted and increased in the future.

7.1.7 We estimate that the scheme could be operational in approximately 14 years from Gate 2, including two years programme float. Therefore, if work was to ramp up immediately after Gate 2, the project could be 'construction ready' in AMP8 (2025-2030) and operational in 2036, should it be required. However, as the project does not need to be 'construction ready' in AMP8 to meet an operational date of 2040, it is proposed that the scheme does not continue on a path to be 'construction ready' in AMP8 and, instead, continues on a slower track towards a proposed Gate 3 'Checkpoint

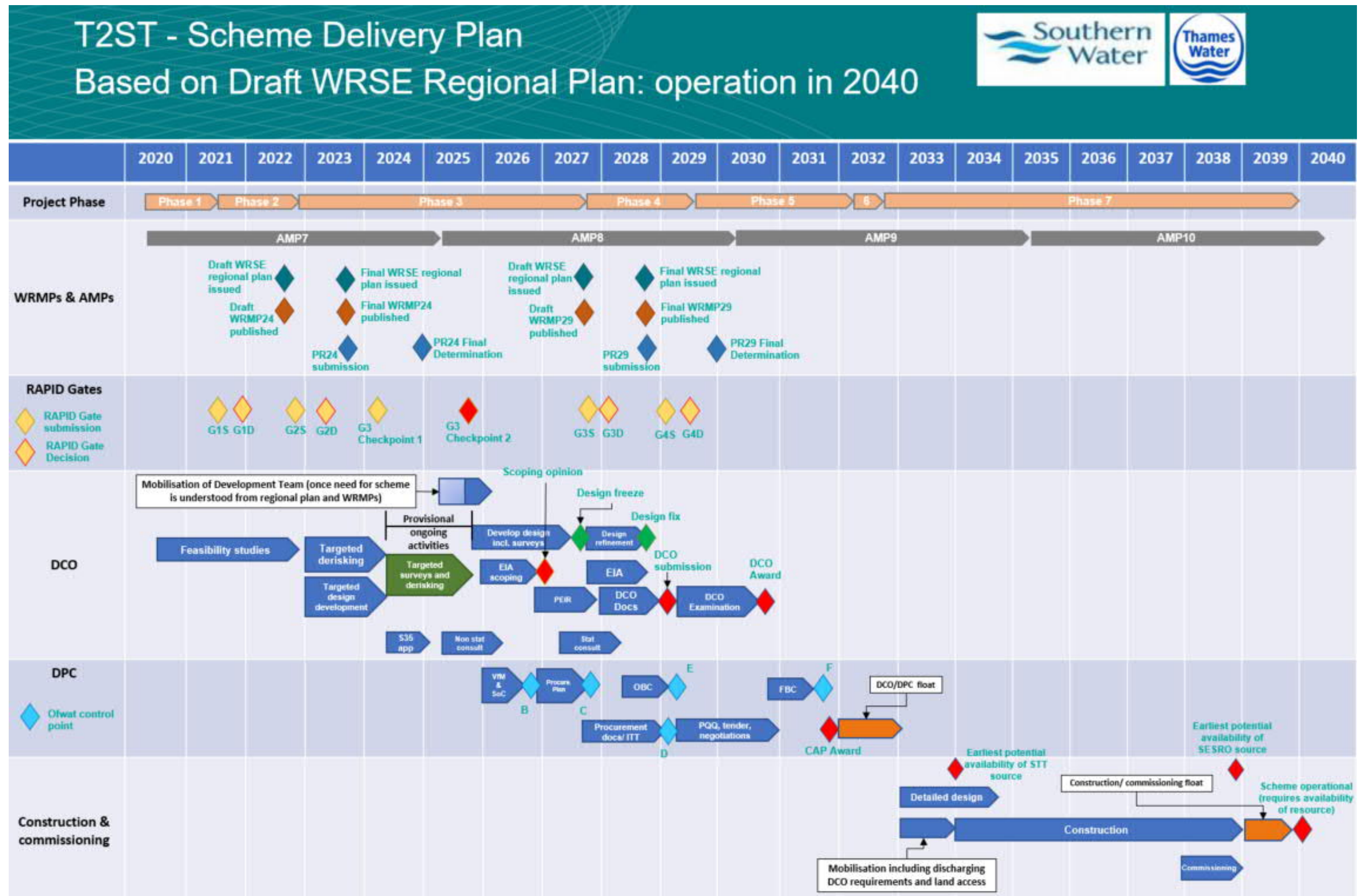
1' in March 2024. This allows the project to continue to be derisked and the interaction with other schemes better developed, while preventing inefficient or abortive work from being done until the outcome of the consenting process for the new source of water has been progressed. The outcomes and scope for this Gate 3 Checkpoint 1 are discussed further in Section 7.4.

- 7.1.8 At this relatively early stage in the project lifecycle, it is difficult to accurately predict programme risk elements that might cause delay. Therefore, in line with the recommendations of the Treasury Green Book (supplementary guidance, Optimism Bias), the schedule for a project of the scale and type of T2ST should be adjusted to account for unknown risks in the delivery of future activities. This is not done at an activity level, but assigned to the higher-level programme, to account for unknown risks that have yet to be defined by the project. The recommended allowance for non-standard civil engineering activities is in the range of 3-25%.
- 7.1.9 This has been accounted for in the project delivery programme in Figure 7-1, with a total of two years of programme risk being allowed for through contingencies added to the programme as float. However, there remains the opportunity to start the consenting phase earlier than currently shown, dependent on a more detailed assessment of the delivery programme and the programme risks. Further details are provided in Annex F: Project Delivery Plan.
- 7.1.10 Based on the proposed scope of works and programme constraints outlined above, our proposed target dates for future RAPID gates are shown in Table 7-2 below. Our recommendation is that Gate 3 is based on achieving the outcomes listed in Table 7-1. Should a programme delay cause any of these outcomes to be delayed (for example, through the need to re-consult on WRMP24), then we would propose the Gate 3 target date be adjusted accordingly. We would seek to discuss this approach with RAPID.

Table 7-2: T2ST proposed target dates for future RAPID gates

Scheme	Gate 3 'Checkpoint 1'	Gate 3 'Checkpoint 2'	Gate 3 target date	Gate 4 target date
T2ST option B or C	March 2024	September 2025	November 2027	January 2029

Figure 7-1: Overview of T2ST project delivery, assuming operation required in 2040. Note: this programme is based on the current need for the scheme in 2040, as per the draft WRSE Regional Plan. If this need changes, the programme would be adapted accordingly. The timing of Gate 3 Checkpoint 2 is driven by the final WRMP24, early outputs from the draft WRMP29, the next WRSE Regional Plan, the DCO consent of the T2ST source, programme delivery risk and any further information that becomes available post-Gate 2.



7.2 Planning and consenting route

- 7.2.1 We have prepared a planning consent strategy report (see Annex G) and the key outcomes and conclusions of that strategy are set out below.

Work done to date to support the proposed land and planning process

- 7.2.2 As part of the Gate 2 planning work package, we have undertaken further assessments of national and local planning policy, alongside the identification and planning assessment of potential T2ST pipeline corridors, as part of multi-disciplinary work. We have given an initial briefing on T2ST and Gate 2 planning work to relevant local planning authorities and the relevant Area of Outstanding Natural Beauty (AONB) unit. We have also reviewed publicly accessible sources of information relating to land as part of our Gate 2 work.
- 7.2.3 Planning leads for T2ST, SESRO, STT and Hampshire Water Transfer and Water Recycling Project Strategic Resource Options (SRO) teams have discussed consent strategies, with a particular focus on the inter-relationships and infrastructure interfaces between them.

Preferred planning route and key planning steps

- 7.2.4 For the Gate 2 preferred options, the preferred planning consent route would be that an application be made to the Secretary of State for a direction under Section 35 of the Planning Act 2008 to make T2ST a project of national significance. This direction would then require that an application for a Development Consent Order (DCO) is made for T2ST, and not a planning application. This would enable a range of other consents to also be secured under the DCO application.
- 7.2.5 However, should a direction not be secured from the Secretary of State, then an application for planning permission would be made instead. We would need to make a planning application to each of the five planning authorities in whose area the option was located, and each would need to approve their application. Given the scale and complexity of the planning applications required, this approach would present additional risks to the scheme in achieving consent and potential delays to programme delivery.

Strategy for obtaining other regulatory consents

- 7.2.6 The DCO process enables land acquisition along with many other consents and powers to be dealt with at the same time. The DCO application may, however, need to be supplemented by other applications because a specific consent cannot be obtained in the DCO, e.g. a consenting authority declines to allow a consent to be obtained in the DCO, or it is not desirable, or it is inappropriate to include a consent within the DCO due to the stage of design development and the level of detail available.
- 7.2.7 If planning applications are required instead of a DCO, then there are a range of other consents that would also need to be secured separately, which could otherwise be consented under a single DCO application.

7.2.8 Although, at this early stage of scheme delivery, the details of the other regulatory consents have not been finalised, we have undertaken preliminary work for the purposes of this Gate 2 submission. This includes compiling a list of licences and consents that may be required as part of the solution design, scheme construction and operational phases of the project (see Annex G).

Land lifecycle

7.2.9 There will be a need for temporary use and permanent land acquisition for T2ST scheme development, whether secured through negotiation and agreement or through the use of compulsory acquisition powers under a DCO or other existing legislation. For the purposes of Gate 2, the planning and consent strategy has sought to reduce land strategy risks relating to the project and enable the more detailed land strategy work package to be procured in a timely manner at the most appropriate point in the overall project programme. Considering the delivery timescales and scheme development, it remains too early to undertake full land referencing, although targeted work beyond Gate 2 to reduce land strategy risks remains appropriate.

Delivering the planning and land acquisition process

7.2.10 As set out in detail in the Project Delivery Plan (see Annex F), the overall programme for T2ST envisages that an application for a DCO would not be made until after the approval of the WRMPs and Regional Plan. This would leave sufficient time to undertake necessary technical and environmental assessments and pre-application engagement. The project delivery plan incorporates the planning and land programme for securing a DCO.

Ensuring a good experience for customers

7.2.11 We held T2ST initial briefing sessions with planning stakeholders, including the relevant local and county planning authorities, and the North Wessex Downs AONB Board. These briefings provided background context on the purpose of the scheme, the nature of work being undertaken for Gate 2 and the options being considered and developed. A commitment was given to further engagement beyond Gate 2. Part of that engagement will be to agree the nature and extent of the community and stakeholder consultation as T2ST progresses.

Managing planning and land risks

7.2.12 The most significant planning constraint relating to the scheme is the North Wessex Downs AONB. A significant length of pipeline and some associated above ground infrastructure associated with the Gate 2 preferred options would be located within the AONB. For T2ST to secure consent, it will be necessary to meet the public interest test, demonstrate exceptional circumstances (including the need for the scheme, the cost and scope for developing elsewhere or meeting the need in another way), and the extent to which environmental effects (including landscape and recreational effects) can be moderated.

7.2.13 On the basis of the need for the scheme and consideration of alternatives to date, an exceptional circumstances case could be made in support of the scheme and, with further and more detailed work on pipeline routing and infrastructure siting, together with mitigation, a policy compliant scheme can be devised. As a result, there is confidence at this stage that a T2ST scheme can be identified, assessed and promoted to successfully secure planning consent.

Planning and consent work beyond Gate 2

7.2.14 Given the long-term nature of the scheme, the focus beyond Gate 2 is on the identified risks and uncertainties relating to T2ST, the more detailed development of the scheme design, mitigation through both route and design evolution, and engagement with stakeholders. This will place T2ST in a strong position for a subsequent application for consent in line with the overall programme for scheme delivery.

7.3 Key risks and mitigation measures

7.3.1 This section provides an assessment of the key risks to the project's planned progress to completion (including requirements at gates). The risks reported in this section are consistent with those reported through the RAPID quarterly reporting process. All of these risks are actively managed and have proposed mitigation measures in place. These risks and mitigations are discussed further in Annex F: Project Delivery Plan.

7.3.2 The Programme Manager undertakes risk management as a standard activity which is governed by the Programme Management Board. This approach is a continuation from Gate 1 and is proposed to continue post-Gate 2.

7.3.3 The overall approach to risk and opportunity management on this programme is to minimise the likelihood and impact of risks occurring, to maximise the value and likelihood of opportunities being realised now or in the future by the programme partners, and to ensure that all realised risks are tracked and managed through a proactive issue management process.

7.3.4 Up to Gate 2, risk has been considered in two ways:

- **Costed risk register:** We have adopted the All Company Working Group (ACWG) costed risk methodology to record risks that have the potential to have a material impact on the overall cost to deliver the scheme. This is discussed further in Section 8 and Annex A4: Cost and Carbon Report. The output from the costed risk register is built into the scheme cost estimate and analysis of cost optimism bias.
- **Scheme delivery risk register:** The key risks from the scheme delivery risk register are shown below in Table 7-3. This is consistent with the version shared with RAPID, through the quarterly reporting process. There are no residual 'red' risks identified and all 'amber risks' are stable and have active mitigations in place.

Table 7-3: Risk register summarising key scheme delivery risks

Green	No risks and progress is going to plan
Amber	There is a risk that is impeding/could impede progress but there is a plan to manage it
Red	There is a risk that is impeding/could impede the progress of the scheme, and there is no plan to manage this

Category	Risk description	Impact rating pre-mitigation	Mitigation	Impact rating post-mitigation	Trend at Gate 2
Interdependencies	Transfer dependent on SESRO, STT or other source. Without parallel development of new sources, the transfer would not be viable. There is a risk that other options are 'competing' for this source of water and, therefore, that there could be insufficient resources to develop the scheme.		Mitigated by working closely with WRSE to ensure the wider options are modelled and the need for the scheme and sources of water are confirmed. We are highlighting consenting interdependencies and infrastructure interfaces between different SROs and undertaking collaborative planning for them.		Stable
Interdependencies	The interaction of potential options to supply water to Southern Water with the ongoing development of its Water for Life Hampshire (WfLH) programme has yet to be finalised. This will help define the need and scale of the T2ST SRO and confirm linkage locations. There is a risk that the need for the scheme may not be fully understood until other schemes are developed, and that the receiving network is not adequately designed to prepare for the likely transfer capacities and connection locations.		The mitigation for this is working closely with other schemes and Southern Water's teams to ensure all teams are working collaboratively and different schemes take account of each other.		Stable
Commercial	How the partners will trade the resource (pricing) has not been agreed or discussed in any detail at this early stage. This will be dependent on the source of the water (SESRO and/or STT) and the commercial arrangements for regional water trading. Likewise, ownership and the operation of any new assets, which are subject to confirmation on the procurement approach (e.g. DPC).		Thames Water and Southern Water are jointly investigating potential commercial setups for delivery of the SRO. Initial discussions on trading/pricing will take place after Gate 2 once the need and utilisation of the scheme have been confirmed.		Stable
Timetable	Interaction with the WRSE Regional Plan and WRMPs (Thames Water and Southern Water) with different timescales and potential difference in reporting requirements. The overall need for the T2ST scheme, the capacity of the proposed scheme and the timing of the schemes are all heavily reliant on the outputs from the Regional Plan.		This is being mitigated through close collaboration with WRSE and the ongoing support from the SRO team, with Thames Water and Southern Water resources as required.		Stable
Environment	Environmental Policy and Destination is currently under review by the National Appraisal Unit (NAU) and WRSE with the involvement of water companies, etc. As such, there are uncertainties to SRO cost/benefit and SRO timing driven by Environmental Policy reviews and size of Environmental Destination. Also, the Regional Plan will be impacted by the scale of the Environmental Destination, which could affect the timing and need for SROs.		This risk is mitigated by WRSE incorporating a range of environmental ambition outcomes in its draft Regional Plan and showing how the options selected would differ under each. WRSE draft Regional Plan (Nov 2022) also highlights future environmental policy risks that could affect intra and inter-regional transfers such as T2ST. Note: this is an overarching risk not specific to T2ST and is managed at a regional level.		Stable
Environment	Potential impacts from the pipelines entering environmentally sensitive areas.		Mitigated through the planning, environmental and engineering workstreams working closely together to explore opportunities to avoid or reduce likely effects on local environmental and social receptors, through the route and site selection process for Gate 2. The SRO team is working closely with stakeholders such as the Environment Agency (EA) and Natural England (NE).		Stable

7.4 Proposed Gate 3 activities and outcomes

7.4.1 As the scheme is not required to be operational until 2040 at the earliest, we propose that Gate 3 is deferred to align with the overall project delivery timeline. This will ensure value for money to customers and also allow the consenting for the source of water (SESRO and/or STT) to progress. However, as we are still in the relatively early stages of concept design development and there are complex interactions with multiple other projects which will be progressing beyond this Gate 2 submission, we do not propose that work stops completely on T2ST.

7.4.2 Prior to Gate 3 we are proposing two Gate 3 'Checkpoints' to help manage this deferral:

- **Gate 3 Checkpoint 1**, which would be after the final WRMPs are published and a period of targeted design development and targeted derisking. This is currently expected to be around March 2024. The purpose of this checkpoint is to re-evaluate the timing and need for the scheme based on final WRMPs and to agree a way forward with RAPID that allows for continued interaction with other projects while ensuring efficiency of spend.
- **Gate 3 Checkpoint 2**, which would signify the ramp-up of the project informed by three key drivers: the agreement of WRMP24 (confirming the need and timing of the scheme); development of the approval of the DCO or other consent for the new source of water in the upper Thames catchment; and a review of the project delivery programme for the T2ST solution, to confirm when work needs to restart. This is currently expected to be in late 2025. The scope of work between Gate 3 Checkpoint 1 and Gate 3 Checkpoint 2 will be agreed with RAPID at Gate 3 Checkpoint 1. It is anticipated that the focus will be on continued targeted design development, targeted surveys and further derisking activities.

7.4.3 The proposed outcomes for Gate 3 Checkpoint 1:

- Greater certainty on the route alignment and locations for above ground infrastructure for the proposed transfer, focussed on potential corridor pinch points. This will be achieved through further desk-based assessment, identification of landowners and some focussed site surveys
- We will have made initial contact and had discussions with critical landowners affected by the scheme, particularly those at the permanent sites of above ground infrastructure and at some potential pinch points in the route corridor, and (if possible) safeguarding and/or allocation of sites and routes will be sought within local plans
- Further developed the interfaces with other schemes, such as SESRO and/or STT as the source and Southern Water's Water for Life Hampshire (WfLH) schemes, to ensure the feasibility of any connections are confirmed. This will include further development of the operational philosophy of the scheme,

abstraction license implications and a clear planning and consenting strategy interaction with other schemes

- We will have fully assessed opportunities to maximise the potential from existing or other planned schemes to ensure we develop the most efficient and lowest impact T2ST scheme. This will include opportunities such as combining the water treatment works at the abstraction location with other schemes and using existing pipeline crossings from other WfLH schemes

7.4.4 To deliver these proposed outcomes, we are proposing work across a number of technical workstreams. These activities will deliver the data collection, analysis and reporting required to enable the proposed objectives at Gate 3 Checkpoint 1. An outline of the proposed work packages is shown in Table 7-4. These tasks have been costed to help provide the project cost estimates in Section 11.2.

7.4.5 We propose that the update provided at Gate 3 Checkpoint 1 is a relatively short document that refers only to significant updates and changes from this Gate 2 submission and will not include the wider Gate 2 supporting documentation.

7.4.6 We will ensure value for money through this Gate 3 checkpoint process by only progressing tasks prior to Gate 3 Checkpoint 2 which materially support the long-term development of the project and help to derisk the project. The estimated budgets to continue this work through Gate 3 Checkpoints 1 and 2 are not considered to be material when considering the overall capex of the scheme and will ensure the project is in a more certain place for planning and consenting when we choose to ramp up development to Gate 3.

7.4.7 The timing of Gate 3 will be agreed with RAPID at Gate 3 Checkpoint 2 when the project is expected to ramp-up in development activities. At this stage, Gate 3 would not be required until late 2027.

7.4.8 There are several key outcomes that we propose to achieve by Gate 3. These are intended to ensure key initial decision points by the principal regulators and consenting authorities have been passed. This ensures that the scheme is more clearly defined and there is a greater level of confidence in the residual issues to be resolved during subsequent stages. These initial decision points include:

- A Section 35 Direction from the Secretary of State and Scoping Opinion, under the Environmental Impact Assessment (EIA) Regulations provided by the Planning Inspectorate, via all required statutory consultation with other regulating authorities. This will define the scope, methodology and timeline for the subsequent EIA that will be required to support the DCO
- Completed initial non-statutory consultation(s) to confirm the balance of public opinion on the scheme. This will help define the design and environmental mitigation issues that require further consideration and development
- Ofwat will have approved Control Points B and C, under their standard DPC process. This will ensure that the initial value for money assessment and the

Statement of Case have been approved. This will enable us to develop the procurement documents for the subsequent tender process and confirm the scope of the future procurement exercise.

Table 7-4: T2ST proposed work packages for Gate 3 Checkpoint 1

Workstream	Key activities
Environmental assessment	Ongoing environmental appraisal of options and alternatives to inform non-statutory consultations and development of initial preferred schemes. This will include focussed environmental screening assessments, archaeology assessments and AONB landscape and habitats assessments as well as further carbon assessment and mitigation.
Survey and monitoring	Commence initial environmental and engineering baseline data collection and surveys as required to inform an initial preferred scheme. This will include targeted environmental baseline surveys to understand critical issues in more detail.
Engineering design	Develop feasibility-level design for the interaction with other schemes, specifically SESRO, STT and the WfLH schemes. Further design refinement to reflect survey data collection and stakeholder feedback at consultation. Further assessment of key pipeline crossings. Develop more detailed construction strategy to derisk project feasibility and costs.
Water resource assessment	Align scheme need, timing and scale to revised draft WRMP24 (or final, if available). Further water resources modelling.
Commercial strategy	As the proposed project lead beyond Gate 2, Southern Water will further develop the proposed commercial and procurement strategy. This will focus on developing the timing and programme for the commercial and procurement aspects of the project rather than progressing through the Ofwat control points. This will include learning from the development of other Southern Water schemes being developed.
Stakeholder engagement	Further public engagement on WRSE and WRMP24 strategic water resource plans. Ongoing technical engagement with regulators and other stakeholders such as Natural England. Engagement with local planning authorities and potential engagement with some key landowners.
Planning and land	Initial liaison and negotiation with affected landowners, particularly for permanent sites and potential corridor pinch points or high-risk areas.
Legal support	Ad hoc support as required on legal issues.
Project management and governance	Day-to-day management and coordination of all tasks and activities to ensure compliance with safety, quality, time and cost requirements. Submission for RAPID Gate 3 Checkpoint 1.

7.5 Procurement, ownership and operation

7.5.1 T2ST is a multi-party asset with strategic importance for the South East of England. Further, the scheme has a capital expenditure (capex) range of £518-£877m (see Section 8), an approximate five-year construction period and an operating life of 100 years⁶. This means that selecting the appropriate delivery route is important to achieving the best outcome for customers and other stakeholders.

⁶ For the pipeline assets.

- 7.5.2 The T2ST scheme could potentially be delivered under a broad range of possible procurement models for delivery and operation. These include:
- In-house delivery
 - Direct Procurement for Customers (DPC) model⁷
 - Specified Infrastructure Projects Regulations (SIPR) model
- 7.5.3 This section builds on the Gate 1 conclusions, through a more detailed assessment of the scheme, in relation to Ofwat's DPC size, discreteness and value for money criteria. This assessment also includes consideration of implications for Thames Water's and Southern Water's financeability under different delivery models, and whether the implementation timescales of DPC and SIPR are compatible with the completion of the scheme, in line with timing specified in the WRSE plan.
- 7.5.4 The conclusions of this assessment are outlined below. In summary, this concludes that competitively tendered models such as DPC or SIPR could offer better value for money than in-house delivery, on the basis that capex and opex efficiencies can be realised and that financing costs are competitive with in-house delivery. We recommend that further market testing and the exploration of 'enhanced' DPC models that are more likely to drive low finance costs, is undertaken post-Gate 2 to validate these assumptions.
- 7.5.5 In relation to SIPR, we conclude that T2ST does not pass the current SIPR 'size or complexity'⁸ test.

Direct Procurement for Customers (DPC)

- 7.5.6 Size: With capex alone of over £500m, T2ST clearly meets the DPC 'size' criteria.
- 7.5.7 Discreteness: T2ST is a relatively standalone potable water treatment and transfer asset with well understood, relatively straightforward interactions with Southern Water's (and Thames Water's) broader water supply system. As a potable water asset that supplies directly into the distribution network, T2ST does materially contribute to Southern Water's statutory obligations. However, we expect that these obligations would be fairly straightforward to codify and manage contractually. As such, T2ST passes the DPC 'discreteness' criteria.
- 7.5.8 We have also undertaken initial modelling, using Ofwat's PR19 assumptions, to inform a view of value for money. This modelling indicates that DPC has the potential to deliver lower costs to consumers than in-house delivery, if DPC delivery can achieve capex and opex efficiencies towards the upper end of the assumed range (c.15%) and a cost-of-capital at the lower end of the assumed

⁷ Including the possible application of various Ofwat pre-defined DPC variants (Early, Late, Very Late and Split) to each scheme, or parts of each scheme. For the avoidance of doubt, this report is based on the DPC model characteristics as set out by Ofwat at PR19, which we refer to as the 'standard form' DPC model. Where appropriate, we set out potential modifications to the standard form DPC model that may deliver improved value for money.

⁸ That the 'project is of a size or complexity that threatens the incumbent undertaker's ability to provide services for its customers'

range (Weighted Average Cost of Capital, or WACC, of c.2.5%).

- 7.5.9 It is not clear how achievable high levels of efficiency over and above the in-house delivery model are likely to be. Assuming delivery of a 'like-for-like' design, high levels of efficiency are likely to be challenging given that the approach to construction of most elements of this scheme (a new water treatment works and laying of a pipeline) is established and mature, and relatively typical for a large water company. On the other hand, there may be opportunities for a DPC provider to take a different view of whole life cost trade-offs and consider alternative design options, such as a different pipeline materials. These opportunities should be investigated and tested further as part of market engagement post-Gate 2, to determine the achievability of Ofwat's assumed 10-15% efficiencies under DPC, specifically for T2ST.
- 7.5.10 Enhancements to the 'standard form' DPC model have also been considered (for example, allowing milestone payments during construction or procuring finance separately to construction contracts) which may increase the likelihood of the DPC model driving lower finance costs, and therefore, greater value for money benefits to customers.
- 7.5.11 In summary, this assessment for Gate 2 supports the Gate 1 conclusion that T2ST is potentially suitable for competitive procurement through DPC, dependent on further exploration of value for money benefits. Further work (including market testing and modelling) is required to validate DPC value for money assumptions, as part of post Gate 2 development. In particular, this will focus on engaging with the construction supply chain and investor landscape to better understand: how key scheme risks are likely to be priced under DPC; how a DPC deal would be structured to attract the most competitive finance costs (including enhancements to the 'standard form' DPC model as highlighted above); and the opportunity for driving greater T2ST-specific capex, opex, and whole-life-cost efficiencies. This insight will be reflected through in-depth financial modelling to understand whether DPC models are likely to drive lower costs to customers compared to the in-house delivery route, and if so, to further develop the preferred DPC model for T2ST.

Specified Infrastructure Projects Regulations (SIPR) model

- 7.5.12 Despite T2ST's scale, we do not consider that it is large or complex enough to satisfy the SIPR criteria that requires schemes to be of a 'size or complexity that threatens the incumbent undertaker's ability to provide services for its customers'.
- 7.5.13 We conclude that either Thames Water or Southern Water could potentially deliver T2ST without putting existing services at risk. Our analysis indicates that T2ST would potentially be financeable by either company, particularly given the timescales for preparation. While large, T2ST is significantly smaller by

comparison than the Thames Tideway Tunnel⁹ project (for example, T2ST's value represents c.16% of Southern Water's AMP7 closing Regulated Capital Value (RCV), and c.6% of Thames Water's AMP7 closing RCV, in comparison to the Thames Tideway Tunnel, which represented 30% of Thames Water's RCV). Therefore, under current legislation, we do not consider T2ST to be applicable for SIPR specification.

- 7.5.14 As a result, we do not recommend considering SIPR further beyond Gate 2 at this stage. However, Ofwat has made a recommendation¹⁰ to the Secretary of State for Business, Energy and Industrial Strategy (BEIS) that the 'size or complexity' test be removed from SIPR legislation, so that SIPR can be applied to a broader range of schemes where a licensed approach would offer value for money. Should these recommendations be accepted and SIPR legislation modified accordingly, we recommend a reassessment of T2ST against the revised applicability criteria.
- 7.5.15 Finally, as one of the later SRO schemes, T2ST will have the advantage of being able to apply lessons from what should be a relatively mature DPC (and potentially SIPR) market by the time it is procured. We recommend that the preferred procurement model for T2ST should reflect these lessons learnt, so that value for money opportunities are maximised.

Promoter assessment

- 7.5.16 As Southern Water customers are the main water resource beneficiaries of the T2ST scheme, we recommend that Southern Water becomes accountable for T2ST promotion post-Gate 2. We also recommend that Southern Water continues to consult with Thames Water (and other relevant stakeholders) throughout the ongoing development of the scheme, particularly alongside the development of SESRO and/or STT as potential sources for T2ST. No further changes to the solution owners are proposed.
- 7.5.17 We propose that the 50:50 split in development costs between Southern Water and Thames Water is continued through to the end of AMP7 at which point Southern Water would pay for 100% of the development.

Risk allocation

- 7.5.18 Under a DPC model, we expect the risk allocation to broadly align to the indicative allocation set out in Ofwat's Direct Procurement for Customers: Technical Review report. However, as T2ST comprises relatively typical water industry assets and, therefore, represents relatively low technical risk during construction and operation, which the CAP supply chain should be well-placed and capable of managing, we expect these risks to be transferred to the CAP as much as practical. On the other hand, the location of the pipeline (through the

⁹ Thames Tideway Tunnel is the only scheme specified under SIPR to date.

¹⁰ [Competition stocktake report final \(ofwat.gov.uk\)](https://www.ofwat.gov.uk/competition-stocktake-report-final/)

North Wessex Downs AONB) means that third-party risks, and delay/cost risks relating to location-specific challenges (for example, archaeological finds during construction), may be significant. These risks would be difficult for the CAP to control and, therefore, should be shared with customers to avoid the CAP building in excessive risk costs into their price.

- 7.5.19 As outlined above, T2ST will have the advantage of being able to apply lessons from what should be a relatively mature DPC (and potentially SIPR) market by the time it is procured – we recommend that particular emphasis is placed on lessons relating to risk transfer.

Procurement risks

- 7.5.20 Under a DPC model, one major risk is that the DPC procurement does not result in prices (particularly finance costs) that achieve better value for customers than in-house delivery. This can be mitigated through further detailed financial modelling of likely scheme costs under DPC, informed by market engagement (as set out in the ‘Forward Plan’ section below), and using the outputs of this to make changes to the procurement model to ensure best value. Further, as set out above, by the time T2ST is procured, there should be a relatively mature market for DPC (and potentially SIPR) and, therefore, the likely results of the DPC procurement will be more predictable.
- 7.5.21 Other than this, the main risks associated with T2ST procurement are those associated with any major procurement activity, for example, a lack of supplier interest or delays in procurement activity. These can be mitigated through robust market engagement and rigorous planning and preparation for the procurement exercise, as set out in the ‘Forward Plan’ section below.

Forward plan

- 7.5.22 We have set out our plan for developing these proposals further beyond Gate 2, including the Ofwat Control Points B and C. We recommend that Ofwat Control Point B should draw on Gate 2 and the subsequent confirmation of need and timing to assemble a strategic outline case at the appropriate time (likely to be 2026 in the earliest required delivery scenario).
- 7.5.23 We also recommend that market engagement with investors and the construction supply chain takes place prior to Gate 3 (but following confirmation of scheme need and timing through the WRMP process), to further understand key commercial risks (including how they would be treated and priced under different models) and gain further insight into the potential structure of the DPC model. This should be used to inform more detailed financial modelling to provide robust evidence for an updated value for money assessment required at Control Point C, which would confirm the preferred procurement model and associated plan.

8. Solution costs and benefits

8.1 Solution cost estimates

- 8.1.1 We have developed cost estimates for the two preferred options B and C at Gate 2. We have derived cost and carbon estimates at 50, 80 and 120 Ml/d capacity for each option, in full accordance with the All Company Working Group (ACWG) cost methodology. Full details of the assessment methodology and solution estimates for both preferred options are set out within the Costs and Carbon Report (see Annex A4).
- 8.1.2 The cost estimate methodology and summary cost tables for options B and C are set out within this section. A summary of the carbon assessment approach and carbon values for the options are reported in Section 6.
- 8.1.3 We have derived cost estimates against the following criteria:
- Capital expenditure (capex)
 - Risk
 - Optimism bias (OB)
 - Operational expenditure (opex)
 - Net present value (NPV)
 - Average incremental cost (AIC)
- 8.1.4 It should be noted that the cost estimates do not allow for the cost of supply of water from either SESRO or STT. The costs of SESRO and STT have been accounted for in the WRSE investment modelling, and in draft WRMPs. The division of costs for these schemes between future recipients has been assumed to be allocated based on future utilisation, with further development to be undertaken during Gate 3.
- 8.1.5 We have undertaken capex estimates using a combination of first principles, using the CCS Candy Platform for infrastructure elements, and a combination of the most appropriate Southern Water and Thames Water cost models for non-infrastructure elements. CCS Candy is an analytic estimating platform in use by many contracting organisations in the UK, enabling collaboration and a basis to challenge supply chain returns as the project progresses through procurement.
- 8.1.6 All infrastructure and non-infrastructure mechanical, electrical, instrumentation, control and automation (MEICA) items have been priced from both the Thames Water and Southern Water suite of parametric models, with the choice of the most appropriate model being taken, based on coverage rules, proximity of the driver ranges to the project's requirements and taking advantage of the most up-to-date data sources present in the models.
- 8.1.7 We have reviewed risk through team workshops, bringing together views from both design, cost and specialist subject matter experts to provide a costed risk register, modelled using Monte Carlo analysis. This assesses known external

- threats and opportunities and assesses a cost and likelihood range for each risk.
- 8.1.8 We have undertaken an optimism bias analysis in accordance with Treasury Green Book recommendations and those of the ACWG. This process assesses the level of knowledge of key components that interface with the project to determine an appropriate allowance within the cost estimate to cover 'unknown unknowns'. The optimism bias allowance will continue to be reviewed at each iteration of the cost estimate to assess the increased level of design detail available as the scheme develops.
- 8.1.9 We have prepared opex estimates for each option, divided into fixed opex and variable opex. Fixed opex is made up of operational maintenance (calculated as a percentage of capex) and staffing costs. Variable opex is made up of electricity and consumables used in treatment and transmission pumping costs.
- 8.1.10 We have calculated NPV estimates over an 80-year appraisal period, consistent with the ACWG guidelines and the approach taken by the local regional group, WRSE. We have profiled capex (including maintenance and replacement costs) and opex forecasts (both fixed and variable costs) over the 80-year appraisal period. The cost base for the estimates is Q2:2022 and all values have been indexed back to 2020/21 prices using indices issued by ACWG.
- 8.1.11 Capex and opex for the two preferred options B and C are summarised in Table 8-1 using a base date of 2020/21. NPV and AIC values are provided in Table 8-2 at full operating capacity and at minimum 15% utilisation at Gate 2. Note that these estimates do not include for the 10Ml/d spur to Newbury which came in following completion of the cost and carbon estimating (see Section 3.4).
- 8.1.12 As the design and solutions have developed between Gates 1 and 2, the appropriate costs presented to provide insight into the changing values have also altered. Gate 1 costs were developed entirely from Thames Water's cost models and, while changes have been made to both diameter and route, the costs remain on average within 10% of those proposed at Gate 1.
- 8.1.13 As the T2ST design solution has developed between Gate 1 and Gate 2, there have been changes in the scheme scope that have impacted on both capex and opex estimates. These include an increase in overall pipeline length for the 80 Ml/d and 120 Ml/d flow cases as a result of greater confidence in the alignment of the pipe routes and clarity on the connection points to the Southern Water network. For the 50 Ml/d flow case the overall pipe length has been reduced compared with Gate 1 quantities by using a proposed Southern Water Andover Link Main, which explains the reduction in Capex from Gate 1 to Gate 2 for this flow condition.
- 8.1.14 The change in pipe alignment from Gate 1 and more detailed assessment of major crossings has led to increased quantities for tunnelled sections for road, rail and river crossings. Storage volumes and sweetening flows have reduced from Gate 1, which has also impacted the Gate 2 capex and opex estimates.

Table 8-1: Capex and Opex for each option (2020/21 base date)

Option Name	Units	Option B			Option C		
Option Benefit	MI/d	50	80	120	50	80	120
CAPEX							
Base Capex	£m	340.6	480.4	560.7	392.6	510.2	589.5
Costed Risk	£m	95.1	121.8	148.4	95.6	120	145.7
Optimism Bias	£m	82.1	115.8	135.1	94.6	122.9	142
Total G2 Capex	£m	517.8	718.0	844.2	582.8	753.1	877.2
Total G1 Capex	£m	621.7	673.6	757.0	621.7	673.6	757.0
Change G1 to G2	%	-17%	7%	12%	-6%	12%	16%
OPEX							
G2 Fixed	£m/ annum	1.5	1.9	2.3	1.6	2.0	2.4
G2 Variable	£/ML	338.4	348.9	352.7	308.4	315.0	332.1
G2 Total at Maximum Flow	£m/ annum	7.6	12.1	17.8	7.2	11.2	16.9
G1 Fixed	£m/ annum	1.4	1.6	1.9	1.4	1.6	1.9
G1 Variable	£/ML	241.0	289.0	315.0	241.0	289.0	315.0
G1 Total at Maximum Flow	£m/ annum	5.8	10.0	15.7	5.8	10.0	15.7
Change (Min Flow)	%	32%	21%	13%	25%	12%	8%

Table 8-2: NPV and AIC costs for each element/option (2020/21 base date)

Option Name	Units	Option B			Option C		
Option Benefit (max flow)	MI/d	50	80	120	50	80	120
Min Flow (Gate 2)	MI/d	7.5	12	18	7.5	12	18
Min Flow (Gate 1)	MI/d	15	24	36	15	24	36
Total planning period option benefit (NPV)	MI	326,709,676	522,735,481	784,103,222	326,709,676	522,735,481	784,103,222
Total planning period indicative capital cost of option (CAPEX NPV)	£m	426.3	586.0	691.9	473.2	610.9	715.3
Total planning period indicative capital cost of option (FINANCE NPV)	£m	371.1	511.4	604.5	412.4	533.4	625.3
Minimum Flow							
Total planning period indicative operating cost of option (OPEX NPV)	£m	42.9	62.2	83.0	43.5	60.6	81.6
Total planning period indicative option cost (NPV)	£m	414.0	573.5	687.4	455.9	594.0	706.9
Average Incremental Cost (AIC)	p/m ³	129	110	88	140	114	90
Gate 1 AIC	p/m ³	143	103	82	143	103	82
Maximum Flow							
Total planning period indicative operating cost of option (OPEX NPV)	£m	136.9	217.2	318.0	129.2	200.6	303.0
Total planning period indicative option cost (NPV)	£m	508.0	728.6	922.5	541.6	734.0	928.3
Average Incremental Cost (AIC)	p/m ³	157	139	118	166	140	118
Gate 1 AIC	p/m ³	160	123	103	160	123	103

8.2 Best value and solution benefits

- 8.2.1 A 'Best Value' water resource plan is one that delivers wider benefits to society and the environment. It considers a range of factors alongside economic cost in the identification of the preferred water resource programme that will form the basis of the plan. The development of a best value plan is promoted by the EA, Ofwat and Natural Resources Wales in the Water Resources Planning Guideline.
- 8.2.2 Neither weights nor monetisation of non-monetised best value criteria have been incorporated into the WRSE programme appraisal process, and instead multi-metric optimisation has been used. The best value criteria assessments were carried out primarily to inform the WRSE draft Regional Plan, which has then subsequently informed the company WRMPs and SRO options appraisal process. Therefore, the approaches used in SRO scoring and appraisal are fully consistent with those used in the WRSE draft Regional Plan and Thames Water and Southern Water WRMPs.
- 8.2.3 The metrics considered in addition to cost and carbon emissions are Natural Capital (NC), Biodiversity Net Gain (BNG), SEA benefit, SEA disbenefit, resilience: reliability, evolvability and adaptability, and customer preference. Scores have been attributed to T2ST sub-components (e.g. conveyance and treatment elements), with some metrics applying to only some sub-components. The T2ST SRO team were actively involved in the development of these metrics alongside the WRSE regional planning team.
- 8.2.4 The methodology for the metrics utilised at a regional level, consistent with the draft WRMPs and T2ST SRO, is provided in Annex 1, Part 3 of the WRSE draft Regional Plan. A summary of the best value metrics utilised for T2ST is included within Thames Water's and Southern Water's draft WRMPs, alongside other SROs and non-SROs for context.
- 8.2.5 The draft WRSE Regional Plan shows:
- In the reported pathway of the preferred plan, T2ST is selected to transfer 120 Ml/d water from 2040 onwards. The T2ST spur to Newbury is also selected to provide 10 Ml/d to the Kennet Valley WRZ from 2040.
 - T2ST also features in alternative pathways 1, 5, and 7 of the WRSE adaptive plan, and in the Best Environment and Society and Least Cost plans. Further details can be found in Sections 10 and 11 of the Thames Water WRMP, and Section 7 of the Southern Water WRMP.

9. Stakeholder and customer engagement

9.1 Introduction

- 9.1.1 This section provides an overview of the engagement completed with

stakeholders and customers. It provides a summary of stakeholders' and customers' views and how these have been considered in the development of the scheme. It also sets out the next steps.

9.2 Stakeholder engagement overview

- 9.2.1 The programme builds on the engagement completed to Gate 1 and takes account of the stakeholder representations submitted to RAPID at Gate 1, as well as direct feedback from RAPID and other regulators.

9.3 Feedback to date

- 9.3.1 The engagement completed to Gate 1 showed that there is in principle support for sharing water resources across the South East region, subject to sufficient resources, compliance with water quality and environmental requirements and responsiveness to local issues and concerns.
- 9.3.2 Specific points of feedback at Gate 1 received from stakeholders opposing SESRO focused on the availability of T2ST information including cost estimates, deployable output and carbon assessments, and challenged the transfer of water from the Thames catchment due to pressure on water resources. Other stakeholders highlighted the opportunities afforded by water transfers to bring best value at a national and regional scale.

9.4 Gate 2 activity

- 9.4.1 Our engagement through Gate 2 comprised two parts. Firstly, engagement to inform the development of the WRSE draft Regional Plan to ensure stakeholders understand how the T2ST, and other SROs, fit within the strategic planning framework, and secondly, scheme-specific discussions to inform the development of the scheme.

9.5 Regional and company-led engagement

- 9.5.1 Since 2019, WRSE has delivered an engagement and consultation programme to inform the development of the WRSE draft Regional Plan. In January 2022, WRSE published the emerging Regional Plan for an eight-week consultation. The emerging plan gave early sight of the big issues and solutions and sought feedback from stakeholders. T2ST was identified as one of the solutions needed to secure a sustainable water supply in the Regional Plan, with the scheme required from the 2050s.
- 9.5.2 Complementing the engagement on the Regional Plan, both Thames Water and Southern Water have established stakeholder forums to enable stakeholders to input to the development of the regional and company water resources plans. Through these forums we have:

- Introduced T2ST to members of Southern Water's Water for Life Hampshire Stakeholder Group (November 2020) and continued to raise the profile of the scheme at subsequent meetings
- Introduced T2ST and shared an overview of the programme and description of the main workstreams (Thames Water and Affinity Water Water Resources Forum, November 2021)
- Shared an update on the refined transfer routes for T2ST (Thames Water and Affinity Water Water Resources Forum, June 2022)

9.5.3 The main points of feedback in relation to intra-regional transfers, and T2ST specifically, are:

- Support for canal and river-based transfers over pipelines, for the environmental benefits that such transfers could bring
- Concerns around cost, carbon, environmental assessment information, water quality and invasive non-native species (INNS) risks
- DWI highlighted the need to fully consider water quality risks. For raw transfers, considering the upstream risks and whether mitigation is required at the receiving location, and for potable transfers, transfer times, disinfection risks and mixing requirements in transfer infrastructure
- DWI also flagged the risk of associated changes to taste or feel, existing and emerging contaminants and potential network impacts from corrosivity
- Natural England (NE) cautioned that new pipelines would only be acceptable if designated sites and priority habitats have been avoided wherever possible, and/or suitably mitigated/compensated, where appropriate, to minimise ecological damage and landscape impacts
- Opponents to SESRO supported the principle of transfer of water into the region but did not support the use of T2ST to transfer water from SESRO on the premise that water should be retained in the Thames catchment.

9.6 Scheme-specific engagement

9.6.1 The active channels of scheme-specific engagement through Gate 2 are presented in Table 9-1.

Table 9-1: Summary of active engagement channels to Gate 2

Stakeholder	Activity
Solution sponsors	Continued close working between Southern Water and Thames Water to understand, and take account of, their respective water supply networks, and planned and future infrastructure, to inform the design work on the intake, pipeline routes and connection into Southern Water's grid
Other potential recipients	Ongoing discussions with South East Water to understand its potential future water needs and preferences for a water transfer. Through these channels, South East Water confirmed that a spur from T2ST was not in its preferred plan but it was keen to keep the option open in the future should T2ST proceed
SESRO and STT Project teams	T2ST is dependent on the prior development of a new source of water, namely Severn Thames Transfer (STT) and/or SESRO. There have been initial discussions to discuss infrastructure interfaces and to ensure the feasibility of the T2ST preferred options, together with consenting relationships
RAPID	Regular engagement to share the programme of work, provide updates on activity and discuss risks and opportunities
NAU	Regular engagement with National Appraisal Unit (NAU), including monthly progress meetings and topic-specific Technical Liaison Groups (TLGs) to foster more collaborative working and enable early constructive discussion. The TLGs that have been established to date are terrestrial environment, aquatic ecology, water quality and algae monitoring, the last two are in conjunction with SESRO and Thames to Affinity Transfer (T2AT)
DWI	Engagement to share the drinking water quality assessment, completed in collaboration with the STT and SESRO SRO teams, as well as the sponsor company teams Engagement on water quality monitoring and consideration of emerging substances
Local planning authorities	Introductory briefing sessions with relevant local and county planning authorities to introduce the scheme, provide an overview of the work being undertaken to Gate 2 and to discuss emerging planning issues and opportunities The local and county planning authorities engaged were Hampshire County Council, Vale of White Horse District Council, Oxfordshire County Council, Test Valley Borough Council, Basingstoke and Deane Borough Council and West Berkshire Council
North Wessex Downs Area of Outstanding Natural Beauty (AONB)	Introductory briefing session to introduce the scheme, provide an overview of the work being undertaken to Gate 2 and to discuss emerging planning issues and opportunities

9.7 A summary of stakeholder views and how they have been considered

9.7.1 Table 9-2 on the following page presents a summary of key discussion topics, stakeholder views and how they have been reflected in the work undertaken.

9.8 Ensuring transparency

9.8.1 We are committed to working openly and transparently. We have engaged and communicated with key stakeholders at the appropriate project programme junctures to share information and provide the opportunity to give feedback that can inform future decisions and planning. We will broaden this work as the scheme progresses.

Table 9-2: Summary of key discussion topics, stakeholder views and how these have been addressed to Gate 2

Stakeholder	Discussion topic	View/feedback	T2ST response
NAU	Route and site selection, including detailed assessments of the preferred corridors and site locations	NAU identified risks with options that involved raw water transfers NAU provided some data on environmental constraints to inform the route and site selection process NAU provided feedback on the shortlisted options, recognising there remained challenges with all options NAU did not indicate that the preferred routes were not feasible NAU provided information on the expected mitigation, for example, for crossing watercourses	The work has refined the options to two potable transfers Information and feedback provided by NAU has informed route and site selection Mitigation suggestions provided by NAU have been included in the design and environmental assessments Constraints and location-specific challenges flagged by NAU have been identified as areas for further work
NAU	Water quality surveys and algae, fish, macrophyte and INNS monitoring	The monitoring plan was agreed with NAU	Following agreement on the monitoring plan, the monitoring activity has been progressed and output will be shared at timely intervals
NAU	Environmental assessment reports (Environmental Assessment Report, Habitats Regulations Assessment and Strategic Environmental Assessment)	The environmental assessment reports were shared for feedback prior to issue (May 2022)	NAU's views and feedback have been incorporated into the reports where necessary and discussed with NAU during monthly meetings
DWI	Drinking water quality assessment and the water quality monitoring and emerging substances	Progress meetings have been held during Gate 2 to inform DWI of the scheme development and water quality assessment. DWI supported the approach taken in developing the T2ST drinking water quality assessment	Following support for the approach, the assessment activity has progressed and output will be shared at timely intervals
Local planning authorities (LPAs)	Introductory briefing sessions	The LPAs provided information for consideration in the ongoing project work. This included comments on emerging Local Plans, future engagement with LPAs and communities, and opportunities for synergistic planning with other infrastructure schemes	These points will be considered in the development of the scheme T2ST has committed to further engagement post-Gate 2
North Wessex Downs AONB	Introductory briefing session	Planning issues relating to major development proposals within the AONB were discussed, including importance of future engagement as the scheme develops	T2ST has committed to further engagement post-Gate 2
SESRO and STT	Interdependencies and co-design of SESRO, STT and T2ST infrastructure to future proof the schemes	Discussion of consenting inter-relationships and consenting of connection infrastructure	Ongoing discussion throughout the scheme development

9.9 Customer engagement overview

9.9.1 This section presents engagement with customers as part of regional planning and scheme-specific research.

Feedback to Gate 1

9.9.2 Research completed during Gate 1 provided evidence on customers' understanding of the need for regional water resource solutions and support in principle for sharing water resources. Customers have firmly established views on the priority of transfer options; these are less favoured than both demand options and supply options such as reservoirs, which customers feel bring added value to the community. Customers want reassurance around the cost impacts and logistics of transferring water to multiple locations and assurances over changes to their drinking water quality.

Gate 2 activity

9.9.3 Therefore, based on feedback received to Gate 1, the Gate 2 programme was designed to address three themes:

- **Best value:** to understand what customers view as 'best value' and how they weight and prioritise attributes, to inform the WRSE Regional Plan
- **Wider benefits or public value:** to seek customers' views on potential wider benefits in the context of water infrastructure, what added benefits are the most important, what they would be willing to pay for and how do their views alter dependent on their proximity to the scheme
- **Changes to source water:** to understand customers' views on changing their drinking water supply and how we would need to communicate such changes

9.9.4 We have worked collaboratively across a group of eight water companies to ensure a consistent and efficient programme of customer engagement to support the development of all the SROs. Where practical, we have used regionally led work, while for other areas we have formed 'club' projects which have involved collaborative working across several of the SROs, using the expertise across the companies. The work was delivered by independent market research agencies with scrutiny from the South East regional Customer Challenge Group (CCG). We also brought in representatives from the Consumer Council for Water (CCW) and the company independent challenge groups on the regional work, and CCW and DWI on the SRO 'club' projects.

9.9.5 These studies are presented in full in the supporting Stakeholder and Customer Engagement Report (see Annex D) and the headline results are summarised in Table 9-3: Summary results from customer engagement.

Table 9-3: Summary results from customer engagement

Topic	Comment
Best value	We engaged with over 300 household customers to explore their preferences regarding the 'best value' criteria developed by WRSE. Overall, customers place more weight on the delivery of a secure supply of water, followed by cost, environmental improvements, and then resilience of the water supply system
Wider benefits	We engaged with over 6,000 customers to understand what added value customers perceive is important as part of water infrastructure development and their preferences for the added value, i.e. what should be the balance between options such as economy, jobs, apprenticeships, leisure, education and carbon sequestration, and how much are customers prepared to pay for the added benefit. The research found that, overall, environmental additions were valued highly, such as the creation of wildlife/new wetlands/habitats. For water transfers via pipeline, opportunities for walking paths and cycle trails and local employment were identified to be important
Changing source water	We engaged with over 2,000 customers to explore customers' views and attitudes towards water source changes and the implications for communications. The research showed that despite customers being unlikely to engage with communications on source change, it is still important to explain any change, with a particular focus on water quality, taste and environmental impact for water transfers

9.10 Next steps

- 9.10.1 Further to confirmation of the timing of T2ST, we will develop a full stakeholder engagement strategy, building on the work completed to date, to identify those organisations and individuals potentially affected. This is to ensure that they have opportunities to engage with, and influence, the proposals before any firm and final decisions are taken.
- 9.10.2 The engagement strategy will include, but not be limited to, landowners, local communities or other potentially affected stakeholders along the route of the scheme. It will also include: Historic England and the County Archaeologist, as the pipeline is adjacent to several heritage sites; infrastructure providers, as the pipeline will involve several roads, river, rail and utility crossings; and the Wildlife Trusts and County Ecologists, to discuss the potential transfer routes and opportunities for mitigation and enhancements.
- 9.10.3 The strategy will also ensure that customers and local communities are engaged with and involved in the evolution and development of the scheme.
- 9.10.4 This engagement will enable the T2ST detailed technical and environmental assessment work to be planned and delivered with issues of importance to consultees and local communities along the pipeline route in mind, as well as seeking opportunities for partnership working to maximise the environmental and social benefits.

10. Board statement and assurance

10.1 Introduction

10.1.1 This section provides a summary of the external assurance completed as evidence of quality of data and approaches and is supported by an approved Board statement from both Southern Water and Thames Water.

10.1.2 We confirm that this submission has been prepared in accordance with the following RAPID assessment criteria:

- **Robustness:** We have completed and reported on all planned Gate 2 activities in this Gate 2 submission with appropriate evidence. We have set out clear activities and outcomes for Gate 3 (Section 7.4) and reported key risks and mitigation measures (Section 7.3)
- **Consistency:** We have undertaken all work following national policy (including draft Water Resources National Policy Statement), guidance and agreed methodologies, and it is consistent with other plans and Strategic Resource Options (SROs). This has included All Company Working Group (ACWG) and WRSE methodologies to ensure consistency across the SROs. This has been ensured through a robust assurance approach described below
- **Uncertainty:** We have reported on assumptions, key risks and mitigation measures for delivery of the scheme (Section 7.3) and our costing methodology has included for optimism bias and costed risk, appropriate to the stage of the scheme's development (Section 8).

10.2 Assurance approach

10.2.1 The risk-based assurance approach is consistent with that documented in the individual companies' statements of reporting risks, strengths and weaknesses¹¹ and final assurance plans for 2020-21 and is based on a shared understanding of the three lines of assurance model shown in Figure 10-1.

10.2.2 This structure is designed to provide challenge and Board oversight to the assurance approach and is consistent with the assurance requirements laid out in Ofwat's Company Monitoring Framework¹³ and RAPID guidance¹⁴.

10.2.3 This approach provides an effective programme of assurance which considers areas that we know are of prime importance to our customers and regulators or may have a significant financial value, alongside the likelihood of reporting issues. Areas of higher risk receive three lines of assurance while other areas,

¹¹ Thames Water: <https://www.thameswater.co.uk/media-library/home/about-us/investors/our-results/previous-reports/2020-21/statement-of-reporting-risks-strengths-and-weaknesses.pdf>

¹² Southern Water: [5353_risksstrengthweaknesses_2020_final.pdf \(southernwater.co.uk\)](https://www.southernwater.co.uk/5353_risksstrengthweaknesses_2020_final.pdf)

¹³ The latest iteration of Ofwat's Company Monitoring Framework can be found on their website through the following link: <http://www.ofwat.gov.uk/publication/company-monitoring-framework-final-position/>

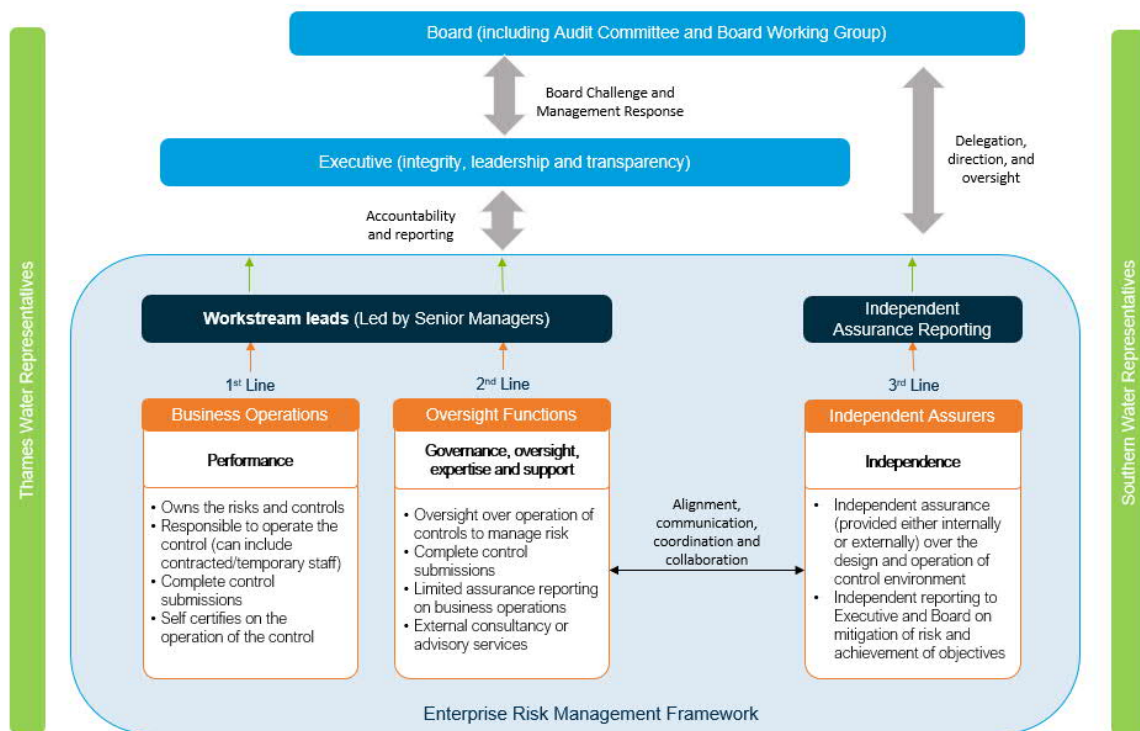
¹⁴ [RAPID - Ofwat](#)

where the risk is lower, may be targeted with first and second line only. We completed a detailed risk assessment and the components requiring third party (independent external) assurance were incorporated into a Request for Quote, which was approved by both Assurance Leads, and issued via the Thames Water procurement route on behalf of both companies.

10.2.4 Jacobs was appointed as our joint external assurer. The assurance process was designed to ensure that feedback from Jacobs was addressed prior to issuing its final assurance report.

10.2.5 Our approach was augmented by experience that the companies gained through the PR19 assurance process and the sharing of best practice (e.g. the use of an independent information declaration form developed by Thames Water, and the Southern Water risk assessment framework), together with the accelerated Gate 2 learnings.

Figure 10-1: Assurance model adopted for T2ST for Gate 2



10.3 Items to highlight and any points for future gates

10.3.1 Our third party assurer has provided assurance that our submission meets the requirements of Gate 2. Additionally, it has confirmed that all material issues raised during the assurance process were addressed.

10.3.2 There were no variances between the views of the respective Thames Water and Southern Water Boards, and the same Board Assurance Statement has been signed by both parties.

10.4 Board assurance statement

- 10.4.1 The signed Board assurance statement is provided in the covering letter.
- 10.4.2 The Boards were consulted regularly throughout this assurance process and the results of assurance work were made available to the Boards of both companies.

11. Efficiency of expenditure for Gate 2 and forecast

11.1 Gate 2

- 11.1.1 The Final Determination (FD) allowance for T2ST was £15m, split equally between Thames Water and Southern Water, with a 15% allocation to Gate 2 equating to £2.25m (£1.125m per water company¹⁵). Further to this, in the Regulators' Alliance for Progressing Infrastructure Development (RAPID)'s Gate 1 Final Decision, it was confirmed that any unspent Gate 1 funding could be utilised up to Gate 2. The Gate 1 underspend was £0.872m. Therefore, the Gate 2 budget available was £3.122m.
- 11.1.2 The total spend to Gate 2 is estimated to be £2.168m, representing 96% of the Final Determination Gate 2 allowance and 69% of the overall budget available, including Gate 1 underspend. This is based on actual costs to the end of August 2022 and approximately £0.15m of forecast costs to the Gate 2 submission in November 2022. This represents a total saving across Gate 1 and 2 of £0.954m. This is also in line with the estimated Gate 2 spend of £2.204m set out at Gate 1.
- 11.1.3 All costs have been split equally between Thames Water and Southern Water as per the Final Determination.
- 11.1.4 The work has built on work undertaken for Water Resources Management Plan 19 (WRMP19) and at Gate 1 and all expenditure relates to activities undertaken to develop and investigate this specific solution. It does not include expenditure on water resources management planning and business planning activities that are baseline company activities. All key activities planned for Gate 2 have been completed.
- 11.1.5 For accurate comparison with the Final Determination allowance, and as requested by RAPID, actual costs are deflated back to a 2017/18 cost base using Thames Water's Internal Business Plan (IBP) deflationary factors.
- 11.1.6 A summary of all costs incurred across the different technical workstreams to Gate 2 is provided below in Table 11-1. The percentage spend on each work package has been benchmarked against a selection of other Thames Water Strategic Resource Options (SROs) and found to be consistent.

¹⁵ <https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-Strategic-regional-water-resource-solutions-appendix.pdf>

Table 11-1: Summary of Gate 2 costs incurred compared by work package

Category	Activity	Expenditure (£, 2017-2018 prices)	% of total expenditure	Description of activity
Programme and project management	Project, programme and commercial management of all SRO work to Gate 2. Includes all assurance activities	349,508	16%	Includes external Programme Manager (part-time), Thames Water and Southern Water governance and oversight Also includes all assurance activities, including some external second line assurance and all independent third line assurance
Feasibility assessment and concept design	Route and site selection work of preferred options from options appraisal outputs, including concept design of preferred options	428,002	20%	Route and site selection methodology and assessment of the preferred options from the work following completion of the options appraisal This covers engineering, environmental and planning inputs. Also includes for the development of design and an updated concept design report
Option benefits development and appraisal	Updated options appraisal, cost and carbon estimating, water resources analysis	243,293	11%	All work associated with the Gate 2 options appraisal This covers engineering, environmental and planning inputs plus all cost and carbon estimating
Environmental assessment	All desk-based environmental studies and assessments for Gate 2 by environmental lead consultant as well as licensing strategy work, hydro-ecological, river water quality and hydro-ecology assessments. Also includes all NAU costs	433,230	20%	Environmental assessment work of preferred route corridors including Habitats Regulations Assessment (HRA), Water Framework Directive (WFD) assessment, Strategic Environmental Assessment (SEA). All written up in Gate 2 Annexes along with an overarching Environmental Assessment Report (EAR) Licensing strategy work undertaken to better understand licensing issues in partnership with other SROs Hydro-ecological, river water quality and hydro-ecology assessments of the River Thames, in partnership with other SROs All third party costs for Natural England and Environmental Agency as part of engagement and reviews by the National Appraisal Unit (NAU)
Data collection, sampling, and pilot trials	All monitoring and sampling	390,574	18%	Includes water quality monitoring and aquatic ecological surveys
Procurement strategy	Procurement and commercial strategy	75,628	4%	Commercial and procurement strategy for overall development of the scheme beyond Gate 2. The output of this work is summarised in the Commercial and Procurement Strategy Report (see Annex E)
Planning strategy	Planning and consenting strategy advice	77,397	4%	Planning and consenting strategy advice for overall development of the T2ST scheme beyond Gate 2. Includes the Commercial and Procurement Strategy Report (see Annex E)
Stakeholder engagement	Stakeholder and customer engagement activities	75,182	3%	All stakeholder and customer engagement activities for Gate 2 including independent customer research
Legal	All legal support to Gate 2 including internal and external legal advice	95,483	4%	Internal Thames Water and Southern Water legal costs as well as inputs from a Combined External Legal Team working on behalf of both water companies
Total		2,168,297	100%	
Gate 2 allowance		3,122,000		
Gate underspend		953,703		

11.1.7 We have ensured efficient spend through:

- Collaborative working between partner companies to ensure no duplication in effort or costs, for example, agreement of consistent methodologies with the All Company Working Group (ACWG) and on combined environmental and resilience metrics across other SROs with WRSE
- Ensuring alignment between the RAPID Gate 2 requirements, the work breakdown structure (WBS) and the work packages initiated
- Agreement of a standardised procurement process across SROs, including combined procurement of work packages where possible
- The continuation of suppliers who delivered efficiently and to a high quality for Gate 1, using competitively tendered framework rates
- Where possible, the application of competitive procurement approaches, with benchmarking between suppliers, utilising established procurement routes which have demonstrated value for money (e.g. existing professional services frameworks with competitively tendered rates). The majority of all work packages (>70%) were competitively tendered at either Gate 1 or Gate 2. This provided benchmarking between competing consultants for each individual package of work within the programme and ensured the work was delivered efficiently
- Efficient packaging of work with clear scopes, defined deliverables and agreed programmes
- Robust change control processes and delivery to budget

11.2 Gate 3

11.2.1 The total FD allowance for Gate 3 is £5.25m (35% of total allowance).

11.2.2 As discussed in Section 7.4, a Gate 3 Checkpoint 1, rather than full Gate 3, is being proposed for T2ST beyond Gate 2 due to the scheme not being required until 2040 at the earliest and the scheme not needing to be 'construction ready' in AMP8. This scope is discussed further in the Project Delivery Plan (see Annex F) but is significantly reduced from the current RAPID Gate 3 requirements. We have compiled a cost estimate for the Gate 3 Checkpoint 1 proposed scope based on a bottom-up estimate of all proposed activities.

11.2.3 The Gate 2 work package leads have estimated the costs for these activities based on the level of effort required and actual costs for Gates 1 and 2. The estimated expenditure for the proposed Gate 3 Checkpoint 1 is £1.899m (in 2017/18 base costs), including an allowance for risk, and we are confident that the planned activities can be undertaken for this budget. We have not developed detailed cost estimates beyond this Gate 3 Checkpoint 1 (i.e. to Gate 3 Checkpoint 2, Gate 3 or Gate 4) as the scope beyond Gate 3 Checkpoint 1 is not yet clear and dependent on the outcomes of the final WRMPs and WRSE Regional Plan.

11.2.4 We propose that this £1.899m comes from a combination of the £0.954m underspend from Gate 2 as well as some of the £5.25m Gate 3 allowance.

11.2.5 A summary of the proposed activities to Gate 3 Checkpoint 1 in March 2024 is provided

below in Table 11-2.

- 11.2.6 No changes to the proposed penalty scale, assessment criteria, delivery incentives or contributions are proposed for Gate 3 Checkpoint 1.

Table 11-2: Gate 3 Checkpoint 1 – summary of proposed activities

ID	Work package	Expected activity summary
1	Programme and project management	Project management; assurance; governance, direction and guidance from within partner companies; procurement support
2	Feasibility assessment and concept design	Further assessment at higher risk locations (above ground infrastructure, route pinch points); ongoing design development; development of connection points at abstraction location and connection into the Southern system; review of opportunities; update of cost and carbon estimates for any significant changes
3	Option benefits development and appraisal	Continued assessment of preferred options
4	Environmental assessment	Screening assessments at some locations; inputs into design development; inputs into consultations
5	Data collection, sampling and pilot trials	Site visits
6	Procurement strategy	Further assessment of the proposed commercial and procurement strategy, including learning from the development of other Southern Water schemes being developed
7	Planning strategy	Engagement with other SRO teams
8	Stakeholder engagement	Third party/Regulator costs; further public engagement on WRSE and WRMP24 strategic water resource plans; ongoing technical engagement with regulators; engagement with local planning authorities; potential engagement with some key landowners
9	Legal	Review of documents; legal counsel
10	Other	None at present

12. Conclusions and recommendations

12.1 Conclusions

- 12.1.1 **Solution design, options and sub-options:** Following completion of an updated options appraisal, route and site selection process and concept design stage, we have developed two preferred T2ST options (B and C) at Gate 2 as summarised in Table 12-1: T2ST preferred options at Gate 2 below. The four raw water transfers to Testwood Lakes from Gate 1 have been screened out and the potable water option with an intake from the River Thames upstream of Reading has been held back. A new source of water is required for the transfer and this is currently anticipated to be South East Strategic Reservoir Option (SESRO) and/or Severn Thames Transfer (STT).
- 12.1.2 In view of the range of solution sizes and uncertainty regarding the need and timing of T2ST, for the purposes of the Gate 2 concept design stage, we agreed with Thames Water and Southern Water that a range of T2ST option capacities should be assessed at 50, 80 and 120Ml/d.

Table 12-1: T2ST preferred options at Gate 2

Option	Description
B	Potable water transfer from land west of the A34 near Drayton to Southern Water supply network in Hampshire. Route west of Newbury, remaining west of the A34. Water source from SESRO and/or STT
C	Potable water transfer from land west of the A34 near Drayton to Southern Water's supply network in Hampshire. Route west of Newbury, crossing east of the A34. Water source from SESRO and/or STT

- 12.1.3 Water Resources South East (WRSE) and the water companies have undertaken extensive modelling to inform the WRSE draft Regional Plan, showing a need for a T2ST scheme of up to 120Ml/d by 2040-2053 (with timing and utilisation depending on the adaptive plan scenario selected). This is the basis on which T2ST has been identified in the WRSE draft Regional Plan and draft Water Resources Management Plans (WRMPs) for consultation in November 2022.
- 12.1.4 **Drinking water quality assessment:** The approach for the T2ST water quality assessment for Gate 2 follows the All Company Working Group (ACWG) methodology to ensure a consistent process of reviewing the strategic water quality risks. Both T2ST preferred options B and C at Gate 2 may be supplied by several different water sources, each with differing water quality risk profiles. These include raw water abstracted directly from SESRO and/or from STT.
- 12.1.5 In all options and water source scenarios, treated water from new surface water sources will be introduced to new regions, including the currently groundwater-fed areas of Kingsclere and Andover. Changes in water source can affect aesthetic risks such as taste and odour, as well as corrosivity. Further work to establish the need for, and nature of, such conditioning will be required in future phases.
- 12.1.6 **Environmental assessment:** In applying the environmental assessments and regulatory assessments to the route corridors and sites comprising the preferred options, we identified a number of constraints and issues for further investigation and work. Potential high-risk issues identified at this stage include: the crossing of an active landfill site in option B (Cliffeville landfill); potential impacts on Sites of Special Scientific Interest (SSSIs) Groundwater Dependent Terrestrial Ecosystem (GWDTE) (both options, but an additional one for option C); and loss of ancient woodland (both options, but higher risk in option C). However, the assessments did not identify any significant environmental risks where mitigation could not be provided and the viability of the T2ST scheme would be affected.
- 12.1.7 Constraints and issues identified include the potential for impacts on sensitive habitats, including several SSSIs (some of which are also GWDTE), Special Areas of Conservation (SACs) and Local Wildlife Sites (LWS), and some priority habitats and species. The proposed pipeline intersects Source Protection Zones (SPZs), including five SPZ1s. The indicative location of the new water treatment works (WTW) at the intake location included within the Gate 2 environmental assessment is partly located on Flood Zones 2 and 3. However, there is an opportunity to move the new WTW to just outside Flood Zones 2 and 3 to avoid the requirement to provide compensatory flood storage to reduce the risk of flooding to the asset and avoid the need for additional

land to provide compensatory flood storage. There are no space constraints for locating the WTW outside of flood risk zones 2 and 3 and this will be taken forward as the design is developed post-Gate 2.

- 12.1.8 **Programme and planning:** As a potable transfer, T2ST would not automatically be a nationally significant infrastructure project. The recommended planning strategy is to seek a Section 35 Direction to confirm that T2ST is a project of national significance requiring an application for a Development Consent Order (DCO).
- 12.1.9 The project could be ‘construction ready’ in AMP8 and could be operational as early as 2036, should a source of water be available. However, based on the WRSE draft Regional Plan requiring a T2ST scheme of up to 120MI/d in 2040 at the earliest, we propose that the scheme does not proceed to be ‘construction ready’ in AMP8.
- 12.1.10 As the scheme is still in the relatively early stages of concept design development, and there are complex interactions with multiple other projects, we propose that focussed work continues beyond Gate 2 towards a Gate 3 Checkpoint 1 in March 2024. At this stage, we anticipate that greater certainty of the need, timing and utilisation of the scheme will be known from the final Water Resource Management Plans (WRMPs) and we can make a firm decision on how to proceed with the scheme.
- 12.1.11 The procurement assessment for Gate 2 supports the Gate 1 conclusion that T2ST is potentially suitable for competitive procurement through Direct Procurement for Customers (DPC), dependent on further exploration of value for money benefits. Further work (including market testing and modelling) is required to validate DPC value for money assumptions, as part of post-Gate 2 development.
- 12.1.12 As Southern Water customers are the main water resource beneficiaries of the T2ST scheme, we recommend that Southern Water takes the lead role in T2ST promotion post-Gate 2, and continues to consult with Thames Water (and other relevant stakeholders) throughout the ongoing development of the scheme.
- 12.1.13 **Stakeholder and customer engagement:** We have worked collaboratively across a group of eight water companies to ensure a consistent and efficient programme of customer engagement to support the development of all the Strategic Resource Options (SROs). Where practical, we have used regionally led work, while for other areas we have formed ‘club’ projects involving several of the SROs and using the expertise across the companies.
- 12.1.14 **Efficiency of Gate 2 spend:** As of the end of August 2022, the total spend to Gate 2 is estimated to be £2.168m, representing 96% of the Final Determination Gate 2 allowance and 69% of the overall budget available, including Gate 2 underspend. This represents a total saving across Gate 1 and 2 of £0.954m. This is also in line with the estimated Gate 2 spend of £2.204m set out at Gate 1.

12.2 Recommendations

- 12.2.1 We recommend that development of the T2ST scheme continues to a Gate 3 Checkpoint 1 in March 2024, at which point we can decide on its further development. A budget of £1.899m (in 2017/18 prices) is recommended to develop the project further

to this Gate 3 Checkpoint 1. The timing of any future gates should align with the overall scheme delivery programme based on the need for the scheme identified in the WRSE Regional Plan and the Thames Water and Southern Water WRMPs.

13. Supporting documentation

13.1.1 A series of documents and other supporting information is submitted as part of this T2ST Gate 2 submission, as summarised below.

Technical annexes

13.1.2 Table 13-1 identifies the technical annexes submitted in support of this Gate 2 report.

Table 13-1: Gate 2 T2ST technical annexes

Annex	Title
A1	Options Appraisal Screening Report
A2	Route and Site Selection Report
A3	Concept Design Report
A4	Costs and Carbon Report
B1	Environmental Assessment Report
B2	Habitats Regulations Assessment Report
B3	Water Framework Directive Report
B4	Strategic Environmental Assessment Report
C	Water Quality Assessment Report
D	Stakeholder and Customer Engagement Report
E	Procurement Strategy Report
F	Project Delivery Plan
G	Planning and Consent Strategy Report
H	Efficiency of Gate 2 Expenditure and Gate 3 Checkpoint 1 Planning Report

T2ST Gate 1 final decision actions

13.1.3 As part of the T2ST Gate 1 final decision, the Regulators' Alliance for Progressing Infrastructure Development (RAPID) identified a series of actions to be undertaken as part of the Gate 2 T2ST work. An update on each of these actions is provided in Table 13-2 below.

Data tables

13.1.4 Data tables, including cost and benefit profiles consistent with Water Resource Management Plan 24 (WRMP24) reporting requirements for T2ST, are included within Annex A4: Costs and Carbon Report.

Table 13-2: RAPID Gate 1 T2ST final decision actions, with Gate 2 updates

No	Section	Detail (from RAPID Final Determination)	Gate 2 update	Reference in Gate 2 documentation
1	Solution design	Complete regional modelling to determine the preferred Strategic Resource Option (SRO) capacity	Water Resources South East (WRSE) and the water companies have undertaken extensive modelling to inform the WRSE draft Regional Plan, showing a need for a T2ST scheme of up to 120Ml/d by 2040-2053 (with timing and utilisation depending on the adaptive plan scenario selected). This is the basis on which T2ST has been identified in the WRSE draft Regional Plan and draft WRMPs for consultation commencing in November 2022.	Gate 2 report, section 7 – Programme and Planning
2	Solution design	Fully identify and assess the impacts of pipeline routes and construction on the environment, particularly on designated sites and river crossings	The route and site selection process has used a web-based GIS system to map designated sites and key constraints. Designations and constraints included ancient woodlands, Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SACs), Special Protection Areas (SPAs), scheduled ancient monuments, development land and existing built infrastructure Route and site selection process has been undertaken taking into account environmental desktop studies NAU has been actively engaged in this process and the draft reports on this have been shared	Gate 2 report, section 3 – Solution design, options and sub options, section 6 – Environmental assessment Annex A2: Route and Site Selection Report Detailed environment assessments included in Annexes B1-B4
3	Solution design	Consider requirements for maintenance flows from the River Thames	This has been reviewed as part of a package of hydrodynamic modelling and licensing strategy across several SROs. However, the River Thames intake option at Reading is being held back due to planning risk – therefore, this is no longer a direct issue for T2ST based on the preferred options B and C being taken forward. Water for T2ST will either be supplied directly from the South East Strategic Reservoir Option (SESRO) and/or a cross connection to Severn Thames Transfer (STT)	Annex A2: Route and Site Selection Report
4	Solution design	Update Table 3 (interrelated schemes affecting need and timing of T2ST) to reflect the current understanding of the Havant Thicket delivery timing, and the requirement and timing of other strategic resolution solutions and other solutions where they have differing timescales. Include the new Havant Thicket+ strategic resource solution in this table and update it at Gate 2 to reflect the decision at Southern Water's accelerated Gate 2	We have continued to work closely with the Southern Water team on this, and the interrelated schemes affecting the timing and need for T2ST have been updated in Table 4-1 in section 4 of this Gate 2 report. These schemes include the Southampton Link Main, Andover Link Main, Havant Thicket Reservoir and the Hampshire Water Transfer and Water Recycling Project	Gate 2 report, section 4 – Water resource assessment
5	Solution design	Ensure regional modelling considers the full range of spur connections and transfers to Portsmouth Water and Wessex Water. Potential supplier to Thames Water's Kennet Water Resource Zone and South East Water should also be included in the scope of work	Regional modelling has included T2ST spur connections to Thames Water Kennet Valley and to South East Water (SEW). The SEW spur has not been selected in the draft WRSE Regional Plan. The 10Ml/d Newbury spur has been selected in the WRSE draft Regional Plan but the Reading spur has not been selected. The potential need for these spurs will continue to be reviewed post-Gate 2 as the Regional Plan is finalised. Transfers to and from Wessex Water and Portsmouth Water are considered as part of the Regional Plan Engagement with WRSE is ongoing to understand if current outputs will meet this requirement, and with the water companies ahead of their WRMP24s	Gate 2 report, section 3 – Solution design, options and sub options Annex A3: Concept Design Report
6	Solution design	Provide a detailed assessment of interdependencies and in-combination impacts with other strategic resource solutions and other solutions required for Gate 2 following the output from the regional modelling	We have undertaken in-combination assessment as part of Gate 2 and this is included in Strategic Environmental Assessment (SEA), Habitats Regulations Assessment (HRA) and Water Framework Directive (WFD) assessments These have been shared as drafts with the NAU	Gate 2 report, section 6 – Environmental assessment Annex B1: Environmental Assessment Report
7	Evaluation of costs and benefits	Undertake regional modelling to quantify the water resource benefits of the solution. As outlined in the response to query TST008, this is expected to be a two-stage process, with an initial phase in late 2021 to model the solution, followed by an update where the updated solution is submitted into a second round of regional modelling in early 2022. The deployable output (DO) should be set out in terms of meeting the deficit	Regional modelling has been undertaken as part of the WRSE draft Regional Plan, which is showing a need for the T2ST scheme of up to 120Ml/d by 2040-2053 (with timing and utilisation depending on the adaptive plan scenario selected) DO modelling has also been undertaken for Gate 2 to assess the conjunctive use benefits of T2ST. This work shows T2ST has a net conjunctive use benefit of 48Ml/d at 120Ml/d capacity, arising from the different characteristics of the Thames Water and Southern Water supply systems	Gate 2 report, section 4 – Water resource assessment Annex A3: Concept Design Report
8	Evaluation of costs and benefits	Further investigate how the solution could improve regional resilience to other water companies such as Portsmouth Water, Bournemouth Water and Wessex Water. Include benefits other than from resilience in water supply and economic benefits, such as environmental, flood and multi-sector benefits	Regional resilience has been considered as part of the WRSE draft Regional Plan. A 'Best Value' water resource plan has been developed which considers wider benefits to society and the environment. It considers a range of factors alongside economic cost in the identification of the preferred water resource programme that will form the basis of the plan. WRSE is carrying out best value analysis to develop the Best Value Regional Plan. The Thames Water and Southern Water WRMPs are cascaded from and fully aligned with the WRSE Regional Plan, and so the same best value metrics have been considered in both plans.	Gate 2 report, section 4 – Water resource assessment, Section 8.2 Annex A3: Concept Design Report